CHAPTER 79

LIST OF EFFECTIVE TEMPORARY REVISIONS

FOLLOWING IS A COMPLETE LISTING OF ALL ACTIVE TEMPORARY REVISIONS (TR'S). TR'S NOT LISTED SHOULD BE REMOVED. THE ATA NUMBER, CONFIG CODE AND PAGE NUMBER IDENTIFIES THE PAGE PRECEDING THE TR.

TR NUMBER	ATA NUMBER	CONFIG CODE	PAGE NUMBER	TR DATE

NONE

CHAPTER 79

OIL

LIST OF EFFECTIVE PAGES

CHAPTER/ SECTION	PAGE	DATE	CONFIG CODE
List of Effective Pages	1	Dec 15/93	
	2	Dec 15/93	
Table of Contents	1	Nov 15/86	
	2	Nov 15/86	
	3	Nov 15/86	
	4	Nov 15/86	
R 79-conts	1	Dec 15/93	
79-conts	2	Dec 15/91	
79-conts	3/4	May 15/86	
79-DIAGM	1	Feb 15/82	
79-DIAGM	2	May 15/82	
79-DIAGM	3/4	May 15/82	
79-INDEX	1	Aug 15/82	
79-INDEX	2	Aug 15/82	
79-INDEX	3	Aug 15/82	
79-INDEX	4	Nov 15/82	
79-00-00	1/2	May 15/77	
79-00-00	101	Nov 15/86	
79-00-00	102	May 15/90	
79-00-00	103	Nov 15/86	
79-00-00	104	May 15/90	
79-00-00	105	May 15/90	
79-00-00	106	May 15/90	
79-00-00	107	Dec 15/92	
79-00-00	108	May 15/90	
79-00-00	109	Dec 15/91	
79-00-00	110	May 15/90	
79-00-00	111	Dec 15/91	
R 79-00-00	112	Dec 15/93	
R 79-00-00	113	Dec 15/93	
R 79-00-00	114	Dec 15/93	
R 79-00-00	115	Dec 15/93	
R 79-00-00	116	Dec 15/93	
R 79-00-00	117	Dec 15/93	
R 79-00-00	118	Dec 15/93	
R 79-00-00	119	Dec 15/93	
R 79-00-00	120	Dec 15/93	
R 79-00-00	121	Dec 15/93	
R 79-00-00	122	Dec 15/93	
R 79-00-00	123	Dec 15/93	
R 79-00-00	124	Dec 15/93	
R 79-00-00	125/126	Dec 15/93	
R 79-00-00	127/128	DELETED	
79-21-00	1/2	May 15/77	
79-21-01	201	May 15/88	
79-21-01	202	May 15/88	
79-21-01	203	Nov 15/78	
79-21-01	204	Nov 15/78	
79-21-01	205	May 15/88	
79-21-01	206	May 15/88	
79-21-01	207	May 15/88	
79-21-01	208	Nov 15/78	
79-21-01	209/210	May 15/88	
79-21-02	201	May 15/88	
79-21-02	202	Dec 15/79	
79-21-02	203	May 15/77	
79-21-02	204	May 15/88	
79-21-02	205	May 15/88	
79-21-02	206	May 15/88	
79-21-02	207	Sep 15/79	
79-21-02	208	May 15/88	
79-21-03	201/202	May 15/77	
79-30-00	1/2	May 15/77	
79-30-00	3/4	Nov 15/84	
79-30-00	101	Mar 15/84	
79-30-00	102	Mar 15/84	
79-30-00	103	Mar 15/84	
79-30-00	104	Nov 15/84	
79-30-00	105	Mar 15/84	
79-30-00	106	Mar 15/84	
79-30-00	107	Mar 15/84	
79-30-00	108	Mar 15/84	
79-30-00	109/110	May 15/86	
79-30-00	111/112	May 15/86	
79-30-00	113/114	May 15/86	
79-30-00	115/116	May 15/86	
79-30-00	117/118	Mar 15/84	
79-31-00	1	Nov 15/84	
79-31-00	2	Jul 15/84	
79-31-00	3	Jul 15/84	
79-31-00	4	Mar 15/81	

APTER/ CTION	PAGE	DATE	CONFIG CODE
-31-00	5	Mar 15/81	
-31-00	6	May 15/86	
-31-00	7	May 15/86	
-31-00	8	Mar 15/80	
-31-00	9	May 15/86	
-31-00	10	May 15/86	
-31-00	201/202	Mar 15/81	
-31-00	501	Jul 15/84	
-31-00	502	May 15/77	
-31-01	401	Aug 15/81	
-31-01	402	Nov 15/88	
-31-01	403	May 15/77	
-31-01	404	Aug 15/81	
9-31-02	401	Aug 15/81	
9-31-02	402	Nov 15/88	
9-31-02	403	Aug 15/81	
9-31-02	404	Nov 15/81	
9-31-02	405	Nov 15/81	
9-31-02	406	Nov 15/81	
9-31-03	401	Aug 15/81	
79-31-03	402	Nov 15/88	
79-31-03	403	Aug 15/81	
79-31-03	404	Aug 15/81	
79-31-04	401	May 15/77	
79-31-04	402	May 15/77	
79-31-04	501/502	May 15/77	
79-31-11	401	Aug 15/81	
79-31-11	402	Aug 15/81	
79-31-11	403	Nov 15/88	
79-31-11	404	Aug 15/81	
79-34-00	1	Aug 15/81	
79-34-00	2	Jul 15/84	
79-34-00	3	May 15/77	
79-34-00	4	Aug 15/81	
79-34-00	5	May 15/77	
79-34-00	6	May 15/77	
79-34-01	401	Nov 15/88	
79-34-01	402	Aug 15/81	
79-34-01	403/404	Aug 15/77	
79-34-02	401	May 15/77	
79-34-02	402	May 15/77	
79-34-02	501/502	May 15/77	
79-37-00	1	Sep 15/80	
79-37-00	2	May 15/77	
79-37-00	3	Nov 15/82	
79-37-00	4	Nov 15/84	
79-37-00	5	May 15/77	
79-37-00	6	May 15/77	

CHAPTER/ SECTION	PAGE	DATE	CONFIG CODE
79-37-00	7/8	May 15/77	
79-37-00	201/202	Mar 15/81	
79-37-01	401	May 15/82	
79-37-01	402	May 15/86	
79-37-01	403	May 15/82	
79-37-01	404	May 15/82	
79-37-01	405/406	May 15/82	
79-37-02	401	Nov 15/81	
79-37-02	402	May 15/77	
79-37-02	403/404	Nov 15/81	
79-37-02	501/502	May 15/77	

CHAPTER 79

OIL

TABLE OF CONTENTS

	Subject	Chapter Section Subject	Page	Effectivity
	INDEX	79-INDEX		
C	FIRM Fault Code Cross Reference		1	ALL
	OIL	79-00-00		
R	Description and Operation		1	ALL
	Fault Isolation		101	ALL

	Subject	Chapter Section Subject	Page	Effec-tivity
	DISTRIBUTION	79-20-00		
	OIL - DISTRIBUTION SYSTEM	79-21-00		
R	Description and Operation		1	ALL
	COOLER - AIR-COOLED OIL	79-21-01		
	Maintenance Practices		201	ALL
	COOLER - FUEL COOLED OIL	79-21-02		
	Maintenance Practices		201	ALL
	VALVE - CONTROL	79-21-03		
	Maintenance Practices		201	ALL

	Subject	Chapter Section Subject	Page	Effectivity
	INDICATING	79-30-00		
R	Description and Operation		1	ALL
	Fault Isolation		101	All
	OIL PRESSURE INDICATING AND WARNING SYSTEM	79-31-00		
R	Description and Operation		1	ALL
R	Maintenance Practices		201	ALL
	Adjustment/Test		501	ALL
	TRANSMITTER - OIL PRESSURE	79-31-01		
	Removal/Installation		401	ALL
	SWITCH - OIL FILTER PRESSURE DIFFERENTIAL	79-31-02		
	Removal/Installation		401	ALL
	SWITCH - LOW OIL PRESSURE WARNING	79-31-03		
	Removal/Installation		401	ALL
	INDICATOR - OIL PRESSURE	79-31-04		
	Removal/Installation		401	ALL
	Adjustment/Test		501	ALL
	SWITCH - FINE SCAVENGE OIL FILTER PRESSURE DIFFERENTIAL	79-31-11		
	Removal/Installation		401	ALL
	OIL TEMPERATURE INDICATING SYSTEM	79-34-00		
R	Description and Operation		1	ALL
	BULB - OIL TEMPERATURE	79-34-01		
	Removal/Installation		401	ALL
	INDICATOR - OIL TEMPERATURE	79-34-02		
	Removal/Installation		401	ALL
	Adjustment/Test		501	ALL

	Subject	Chapter Section Subject	Page	Effectivity
	INDICATING (CONT)	79-30-00		
	OIL QUANTITY INDICATING SYSTEM	79-37-00		
R	Description and Operation		1	ALL
R	Maintenance Practices		201	ALL
	TRANSMITTER - OIL QUANTITY	79-37-01		
	Removal/Installation		401	ALL
	INDICATOR - OIL QUANTITY	79-37-02		
	Removal/Installation		401	ALL
	Adjustment/Test		501	ALL

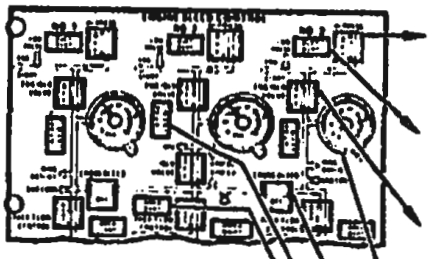
CHAPTER 79-OIL

TABLE OF CONTENTS

	Subject	Chapter/ Section Subject	Page
	FAULT CODE DIAGRAMS		1
	FAULT CODE INDEX		1
	OIL	79-00-00	
	GENERAL		101
	FAULT ISOLATION/IDENTIFICATION		101
	Component Locator Diagram		104
	High oil consumption or oil replenishment high		108
R	Low indicated oil pressure		112
	Trend shows oil pressure increasing		114
	Oil FILTER PRESSURE light 'ON' (All other indications normal)		116
R	Abnormal oil quantity indication		117
	OIL PRESS Warning light 'on' (all other indications normal)		118
	High indicated oil temperature		119
	Oil hiding (Severe loss of oil contents, with/without pressure fluctuations)		122
	Oil Quantity Indicating System Schematic		125/126
	OIL SYSTEM INDICATING	79-30-00	
	General		101
	Fault Isolation/Identification		101
	Component Locator Index		103
	Oil System Indication Components Locator		104
	Oil Pressure Indication Fault Isolation		106
	Oil Temperature Indication Fluctuates		107
	Oil Quantity Indication Fluctuates		108
	Engine No. 1 Oil Pressure Indicating and Warning System Schematic		109/110
	Engine No. 2 Oil Pressure Indicating and Warning System Schematic		111/112

Subject	Chapter/ Section Subject	Page
OIL SYSTEM INDICATING (CONT)	79-30-00	
Engine No. 3 Oil Pressure Indicating and Warning System Schematic		113/114
Oil Quantity Indicating System Schematic		115/116
Oil Temperature Indicating System Schematic		117/118

POWERPLANT CONTENTS



(FE/SO PANEL)

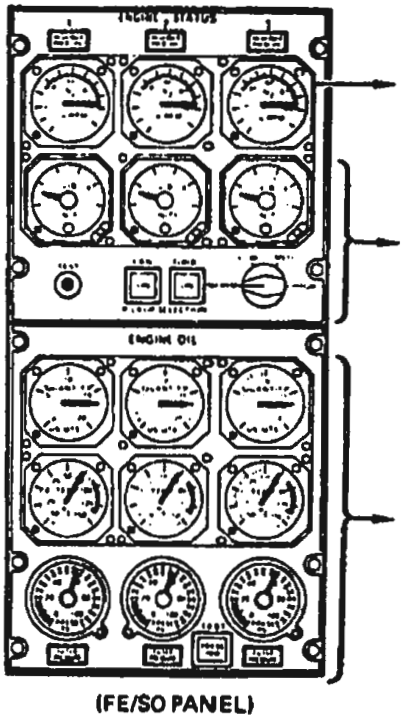
CROSSBLEED START
ENGINE BLEED AIR
NACELLE/PYLON
OVERHEAT DETECTION

DUCT OVHT, ENGINE
(1, 2, OR 3)

GROUND START VALVE
OPEN LIGHT
ENGINE BLEED AIR

CROSSBLEED START
POSSIBLE
OVERTEMPERATURE/HIGH
TEMPERATURE
ENGINE BLEED AIR

CROSSBLEED START
AREA OVHT, BLEED AIR
(J)
AREA OVERHEAT TEST
AREA OVHT, BLEED AIR
(D, E, OR H)



(FE/SO PANEL)

STARTING

AIRBORNE VIBRATION
MONITOR
N2 OVERSPEED
N2 INDICATOR

ABNORMAL OIL SYSTEM
INDICATIONS
RISE IN FUEL/OIL
TEMPERATURE
STARTING
OIL PRESSURE LOW/HIGH
OIL FILTER PRESSURE
LIGHT
ENGINE FLAMEOUT

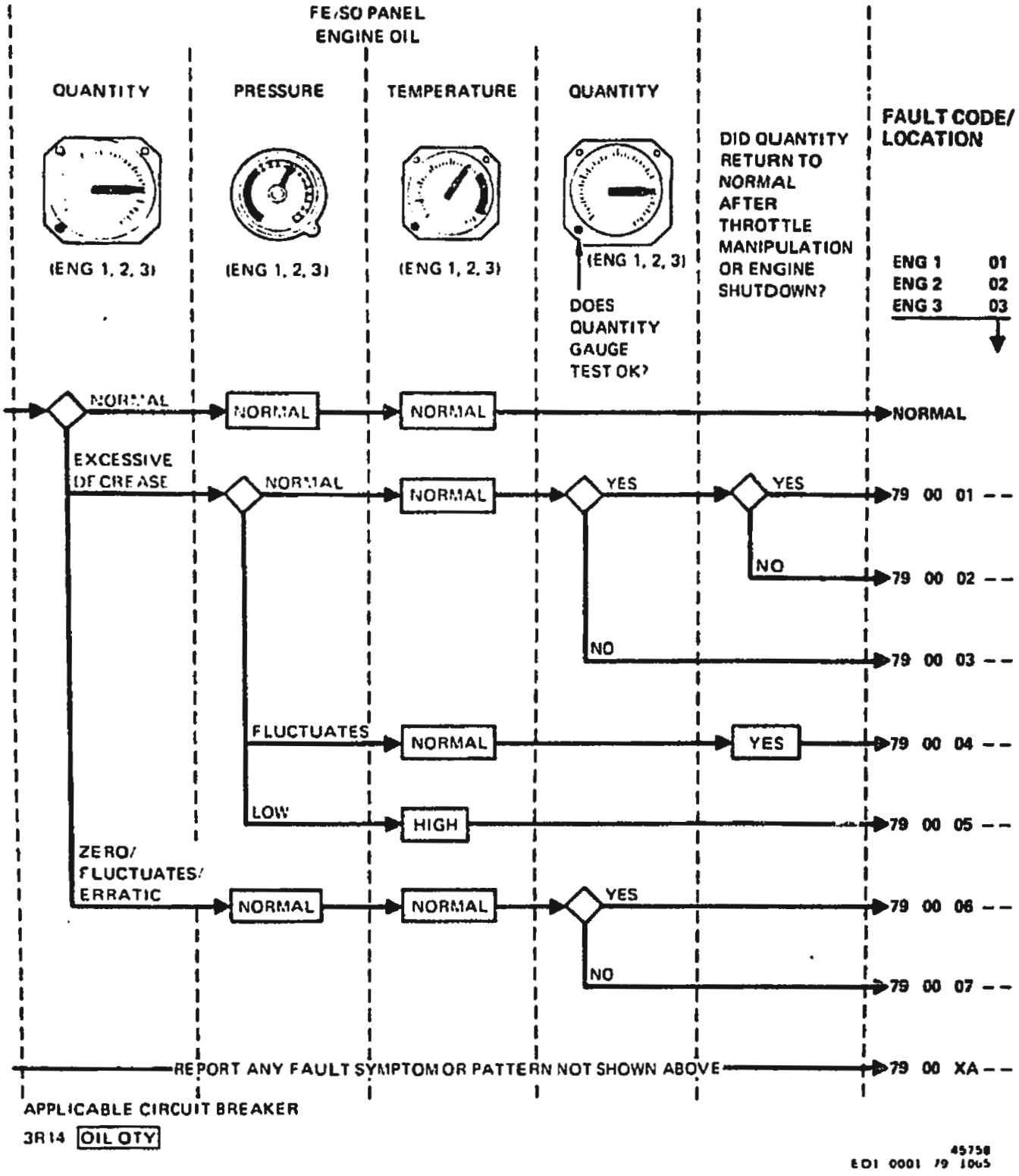
TITLE	CHAP/SEC
ABNORMAL OIL SYSTEM INDICATIONS	7900
AIRBORNE VIBRATION MONITOR	7731
AREA OVERHEAT TEST	3600
AREA OVHT, BLEED AIR (D, E, OR H)	3600
AREA OVHT, BLEED AIR (J)	3600
CROSSBLEED START	3600
DUCT OVHT, ENGINE (1, 2, OR 3)	3600
ENGINE BLEED AIR	3600
ENGINE FLAMEOUT	7100
GROUND START VALVE OPEN LIGHT	8011
NACELLE/PYLON OVERHEAT DETECTION	2600
N2 INDICATOR	7712
N2 OVERSPEED	7100
OIL FILTER PRESSURE LIGHT	7900
OIL PRESSURE LOW/HIGH	7900
POSSIBLE OVERTEMPERATURE/ HIGH TEMPERATURE	7100
RISE IN FUEL/OIL TEMPERATURE	7337
STARTING	7100

M1-0002-71-8505

R POWERPLANT CONTENTS

EFFECTIVITY: ALL

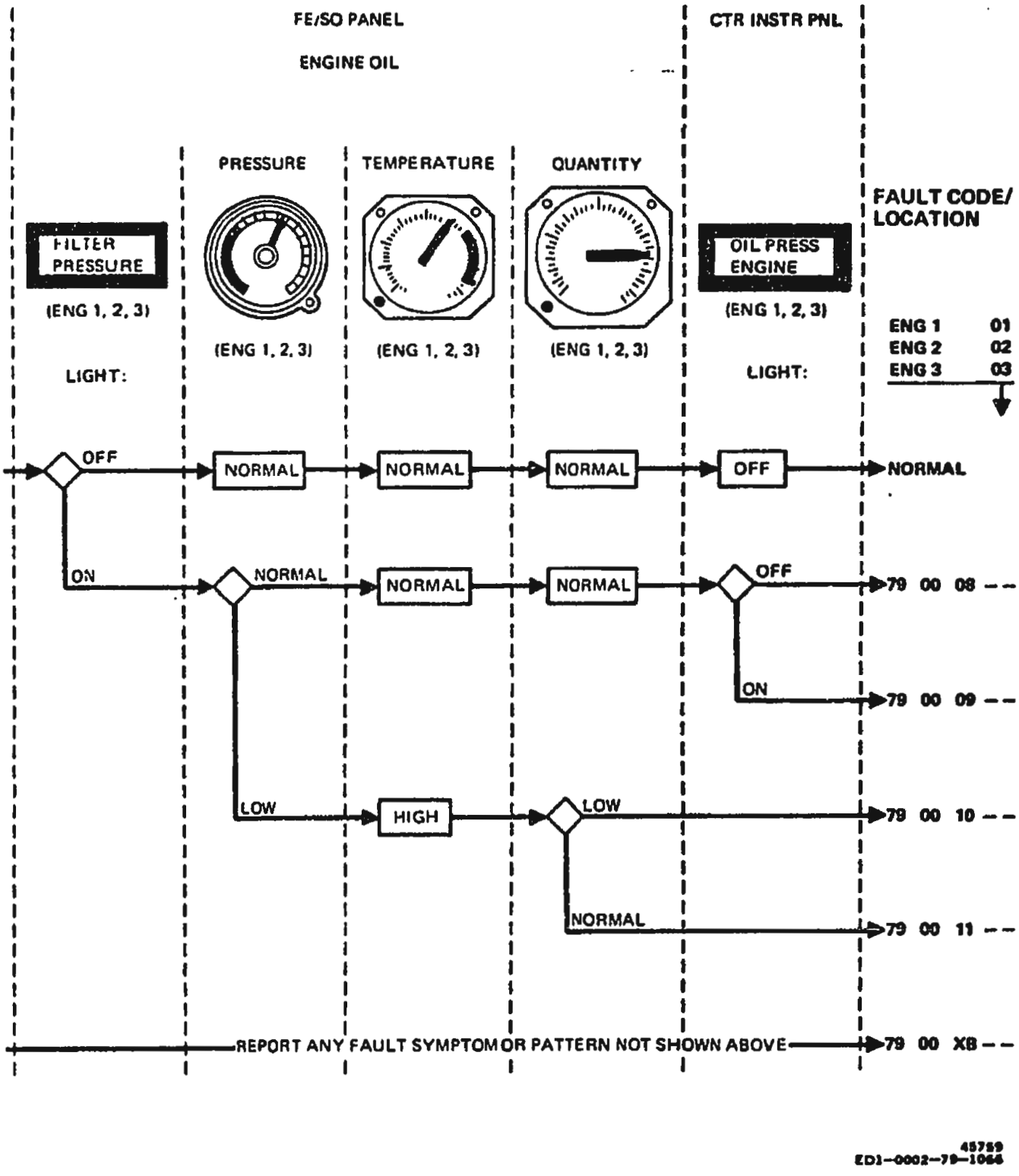
001B



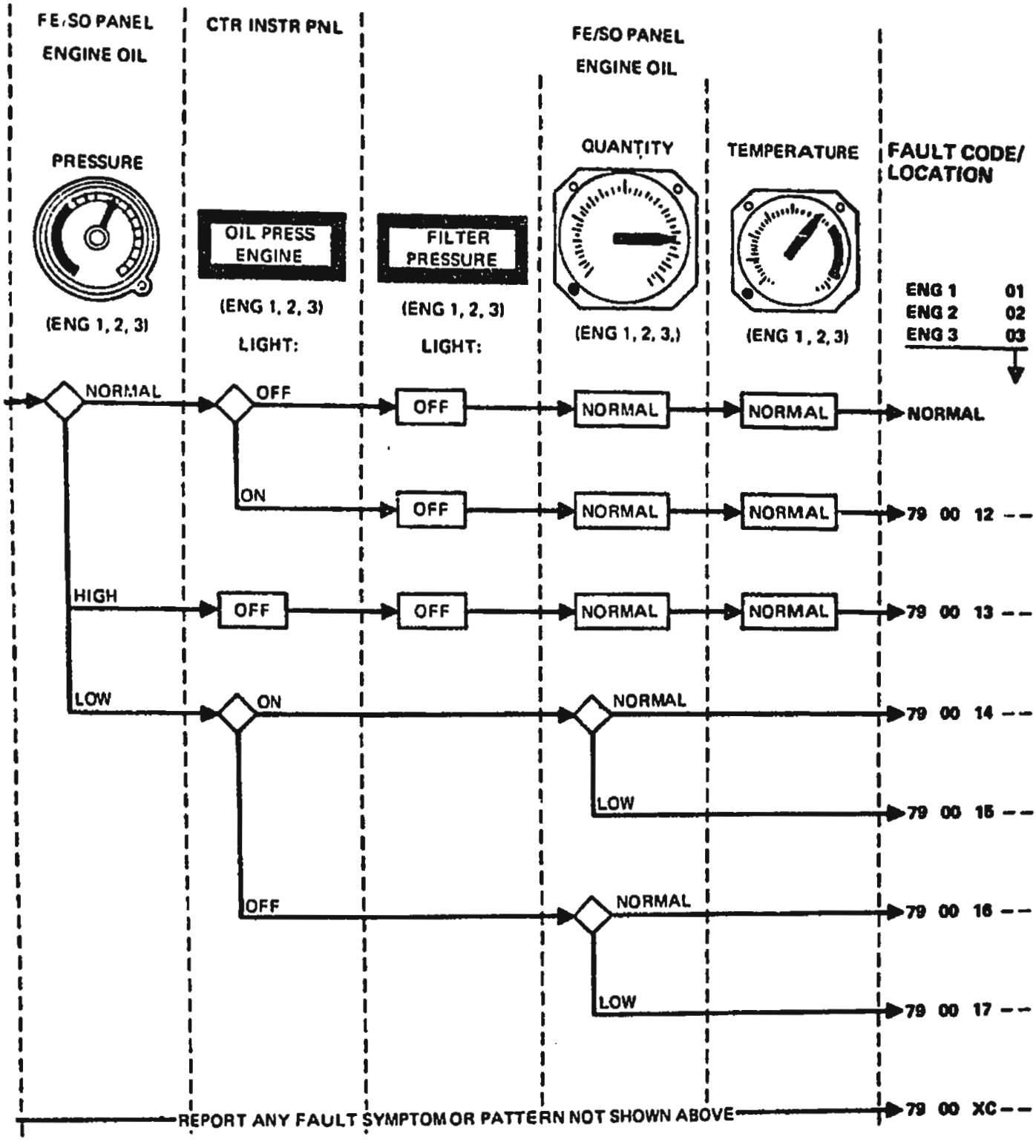
R Oil Quantity - Fault Codes
Figure 1

R EFFECTIVITY: ALL

79-FAULT CODE DIAGRAM



R Oil Filter Pressure Light - Fault Codes
Figure 2



R

Oil Pressure - Fault Codes
Figure 3

EFFECTIVITY: ALL

79-FAULT CODE DIAGRAM

OB

FAULT CODE INDEX
TABLE 1

	FAULT CODE	1. LOG BOOK REPORT 2. FAULT ISOLATION REFERENCE
	79 00 XA __	1. An Oil Quantity fault was encountered by the crew which is not covered in the fault code diagram. (Ref. Fault Code diagram for flight crew actions.)
R		2. 79-00-00 Fig. 103, 107, 110 Block 1
	79 00 XB __	1. An Oil Filter Pressure Light fault was encountered by the crew which is not covered in the fault code diagram. (Ref. Fault Code diagram for flight crew actions.)
R		2. 79-00-00 Fig. 103, 104, 106, 110 Block 1
	79 00 XC __	1. An Oil Pressure fault was encountered by the crew which is not covered in the fault code diagram. (Ref. Fault Code diagram for flight crew actions.)
R		2. 79-00-00 Fig. 103, 104, 105, 108 Block 1
	79 00 00 00	1. NOT USED.
	79 00 01 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) excessive decrease in oil quantity indication. Other oil system indications normal and quantity BITE test OK. Oil quantity returned to normal after throttle manipulation/engine shutdown.
		2. 79-00-00 Fig. 110 Block 1
	79 00 02 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) excessive decrease in oil quantity indication. Other oil system indications normal and quantity BITE test OK. Oil quantity did not return to normal after throttle manipulation/engine shutdown.
		2. 79-00-00 Fig. 107 Block 3

FAULT CODE INDEX
TABLE 1 (CONTINUED)

FAULT CODE	1. LOG BOOK REPORT 2. FAULT ISOLATION REFERENCE
79 00 03 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) excessive decrease in oil quantity indication. Other oil system indications normal. Quantity BITE test not OK.
	2. 79-00-00 Fig. 107 Block 2
79 00 04 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) excessive decrease in oil quantity indication. Oil press fluctuated with temp normal. Quantity returned to normal after throttle manipulation/engine shutdown.
	2. 79-00-00 Fig. 110 Block 1
79 00 05 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) excessive decrease in oil quantity indication. Oil press low and temp high.
	2. 79-00-00 Fig. 103 Block 1
79 00 06 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) oil quantity indication fluctuates/reads zero/erratic. Other oil system indications normal. Quantity BITE test OK.
	2. 79-00-00 Fig. 107 Block 3
79 00 07 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) oil quantity indication fluctuates/reads zero/erratic. Other oil system indications normal. Quantity BITE test not OK.
	2. 79-00-00 Fig. 107 Block 2
79 00 08 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) oil FILTER PRESSURE light on. All other oil system indications normal.
	2. 79-00-00 Fig. 106 Block 1

FAULT CODE INDEX
TABLE 1 (CONTINUED)

	FAULT CODE	1. LOG BOOK REPORT 2. FAULT ISOLATION REFERENCE
	79 00 09 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) oil FILTER PRESSURE and OIL PRESS lights on. All other oil system indications normal.
		2. 79-00-00 Fig. 106 Block 1
	79 00 10 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) oil FILTER PRESSURE light on. Oil press and quantity low, temp high.
		2. 79-00-00 Fig. 103 Block 1
	79 00 11 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) oil FILTER PRESSURE light on. Oil press low, temp high. Oil quantity normal.
R		2. 79-00-00 Fig. 104 Block 8
	79 00 12 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) OIL PRESS light on. All other oil system indications normal.
		2. 79-00-00 Fig. 108 Block 1
	79 00 13 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) oil press indication high. All other oil system indications normal.
		2. 79-00-00 Fig. 105 Block 1
	79 00 14 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) oil press indication low. OIL PRESS light on. Quantity normal.
R		2. 79-00-00 Fig. 104 Block 8
	79 00 15 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) oil press indication low, oil quantity low and OIL PRESS light on.
		2. 79-00-00 Fig. 103 Block 1

FAULT CODE INDEX
TABLE 1

FAULT CODE	1. LOG BOOK REPORT 2. FAULT ISOLATION REFERENCE
79 00 16 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) oil press indication low. OIL PRESS light off and quantity normal. 2. 79-00-00 Fig. 104 Block 2
79 00 17 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) oil press indication low. Oil quantity low and OIL PRESS light off. 2. 79-00-00 Fig. 103 Block 1
79 00 18 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) oil temp high, oil press and fuel temp normal. (Ref. Chapter 73 for Fault Code diagram.) 2. 79-00-00 Fig. 109 Block 2
79 00 19 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) oil and fuel temp increased, oil press decreased. Increasing engine rpm did not reduce temp. (Ref. Chapter 73 for Fault Code diagram.) 2. 79-00-00 Fig. 109 Block 5
79 00 20 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) no indication of oil press within 30 seconds of N3 rotation. (Ref. Chapter 80 for Fault Code diagram.) 2. 79-00-00 Fig. 104 Block 2

OIL - DESCRIPTION AND OPERATION

1. General

The oil system is of the self-contained, full flow, re-circulatory type and provides the lubrication and cooling oil flow to the engine bearings, gears and splines. The system is described in 72-01-00.

Oil is drawn from the oil tank, which is integral with the high-speed external gearbox, by a pressure pump and returned by six scavenge pumps, so effecting a continuous re-circulatory flow.

Filtration is provided by pressure, thread-type and gauze filters in the feed oil system and by gauze strainers and a fine scavenge filter in the return oil system.

The engine bearing chambers and the oil tank vent into the external gearbox, which in turn is vented to atmosphere through a centrifugal breather.

Oil cooling is achieved using an air cooled and a fuel cooled oil cooler which utilize low pressure compressor air and low pressure fuel respectively, as the cooling media. The oil flow path through the coolers is determined by a temperature sensitive control valve.

A high pressure relief valve protects the system from excessive pressures, each oil cooler incorporates a relief valve to protect the matrices, and the fine scavenge filter incorporates a by-pass valve which functions in the event of filter restriction.

Provision is made for flight station indication of oil tank quantity and system operating pressures and temperature.

OIL - FAULT ISOLATION

1. General

The diagrams and schematics in this section can be used for fault isolation any time a fault is reported or suspected. Uncommon abbreviations are defined on the using fault code diagram or schematic.

C NOTE: Procedures for troubleshooting Inflight Shutdown due to
C high AVM, oil filter differential pressure warning
C light ON, and low oil pressure are located in 77-31-00.

If the flight crew reports a fault using a fault code number, the code number can be found in the Fault Isolation Reference Table in the Chapter 79 Fault Code Index. The index specifies the exact maintenance manual section, fault isolation diagram, and block number on the diagram where the fault isolation procedure should start. Where applicable, schematics are included at the end of the section to supplement the fault code diagrams or as an aid in isolating a problem not covered on the diagrams.

Refer to the Maintenance Manual Introduction for a more detailed discussion of the Fault Isolation Reporting Method (FIRM) and use of fault isolation diagrams/schematics.

2. Fault Isolation/Identification

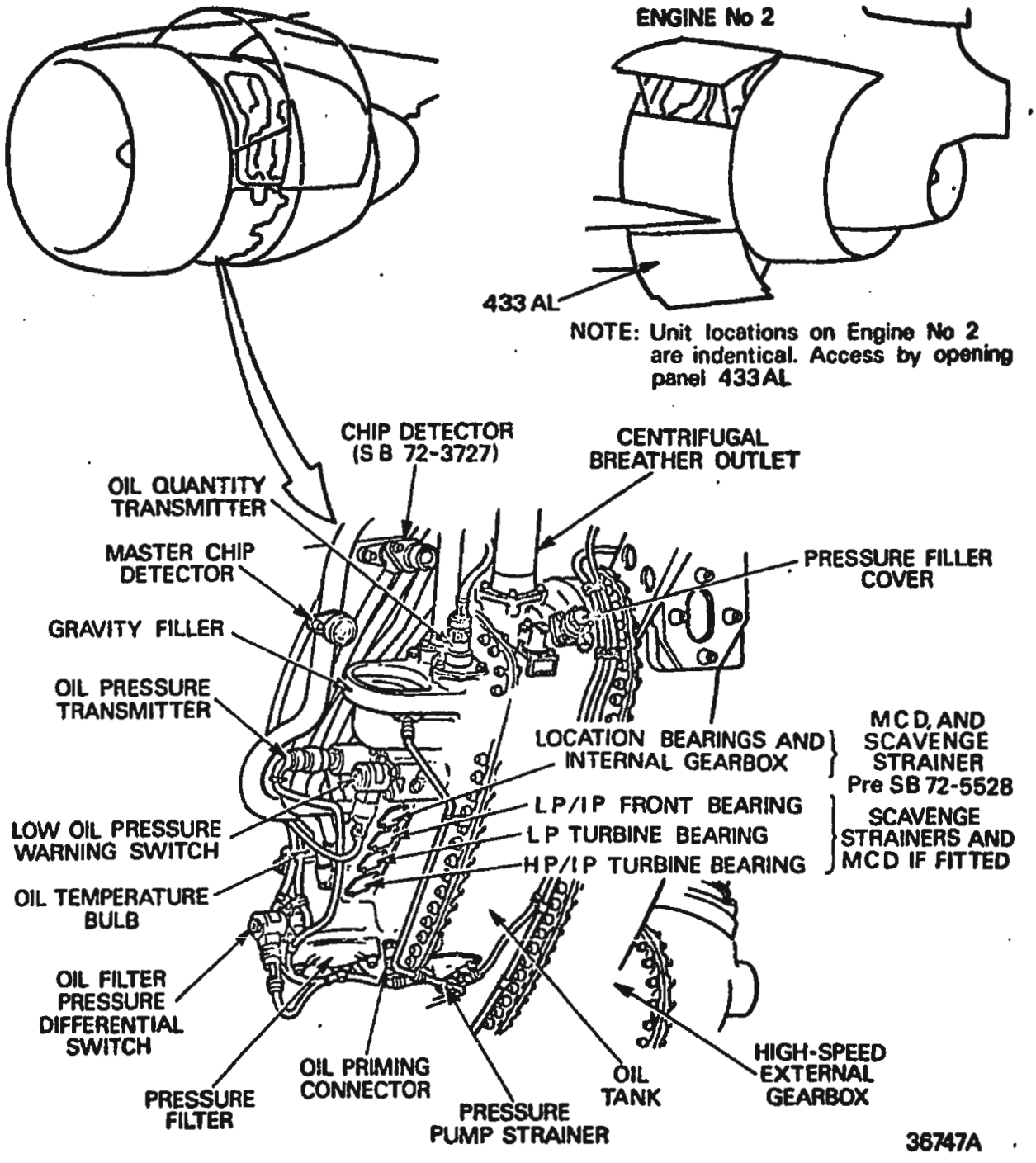
Table 101 lists the fault isolation diagrams and schematics in this section.

TABLE 101

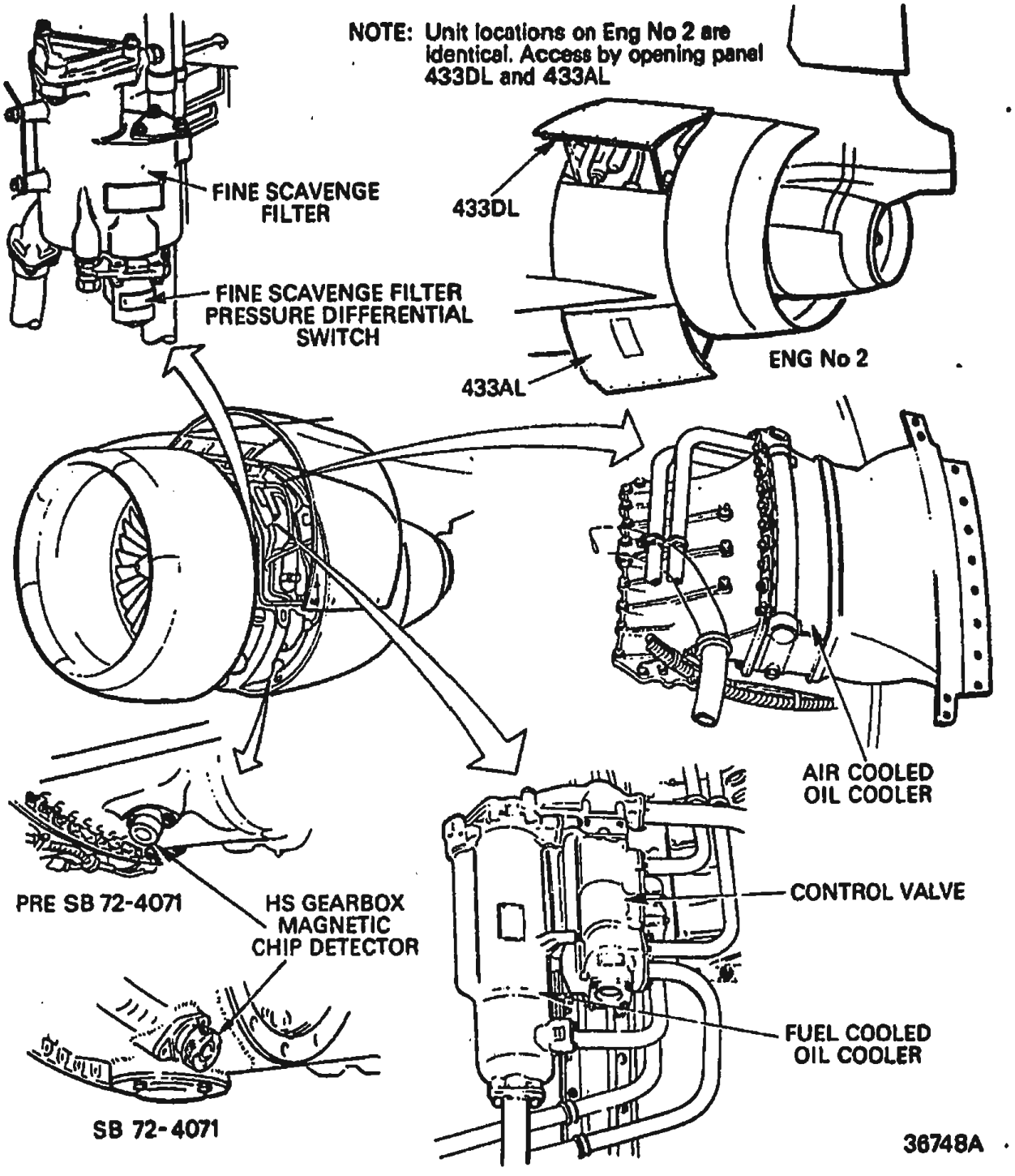
	FIGURE	TITLE
	Fig.103	High oil consumption or Oil replenishment high
	Fig.104	Low indicated oil pressure
	Fig.105	Trend shows oil pressure increasing
	Fig.106	Oil filter pressure light 'on' (all other indications normal)
	Fig.107	Abnormal oil quantity indication
	Fig.108	OIL PRESS warning light 'on' (all other indications normal)
	Fig.109	High indicated oil temperature
	Fig.110	Oil hiding (severe loss of oil contents, with/without pressure fluctuation)
R	Fig.111	Trouble shooting oil smell (smoke) reports
R	Fig.112	Oil quantity indicating system schematic

COMPONENT	QTY	ACCESS/AREA	REFERENCE
BULB - OIL TEMPERATURE	3	413A,423A,433AL	79-34-01
CHIP DETECTOR - MAGNETIC	6	413A,423A,433AL	72-01-00
FILTER - FINE SCAVENGE	3	413A,423A,433AL	72-01-00
FILTER - PRESSURE	3	413A,423A,433AL	72-01-00
GEARBOX - EXTERNAL	3	413A,423A,433AL	72-00-06
INDICATOR - OIL TEMPERATURE	3		79-31-02
INDICATOR - PRESSURE	3		79-31-04
INDICATOR - OIL QUANTITY	3		79-37-02
OIL COOLER - AIR COOLED	3	413A,423A,433DL	79-21-01
OIL COOLER - FUEL COOLED	3	413A,423A,433DL	79-21-02
PUMP - OIL	3	413A,423A,433AL	72-63-00
STRAINER - SCAVENGE	15	413A,423A,433AL	72-01-00
TRANSMITTER - OIL PRESSURE	3	413A,423A,433AL	79-31-01
TRANSMITTER - OIL QUANTITY	3	413A,423A,433AL	79-37-01
VALVE - RELIEF (OIL COOLER)	3	413A,423A,433DL	79-21-01
SWITCH - DIFFERENTIAL OIL FILTER PRESSURE	3	413A,423A,433AL	79-31-02
SWITCH - LOW OIL PRESSURE WARNING	3	413A,423A,433AL	79-31-03
SWITCH - FINE SCAVENGE OIL FILTER DIFFERENTIAL	3	413A,423A,433AL	79-31-11

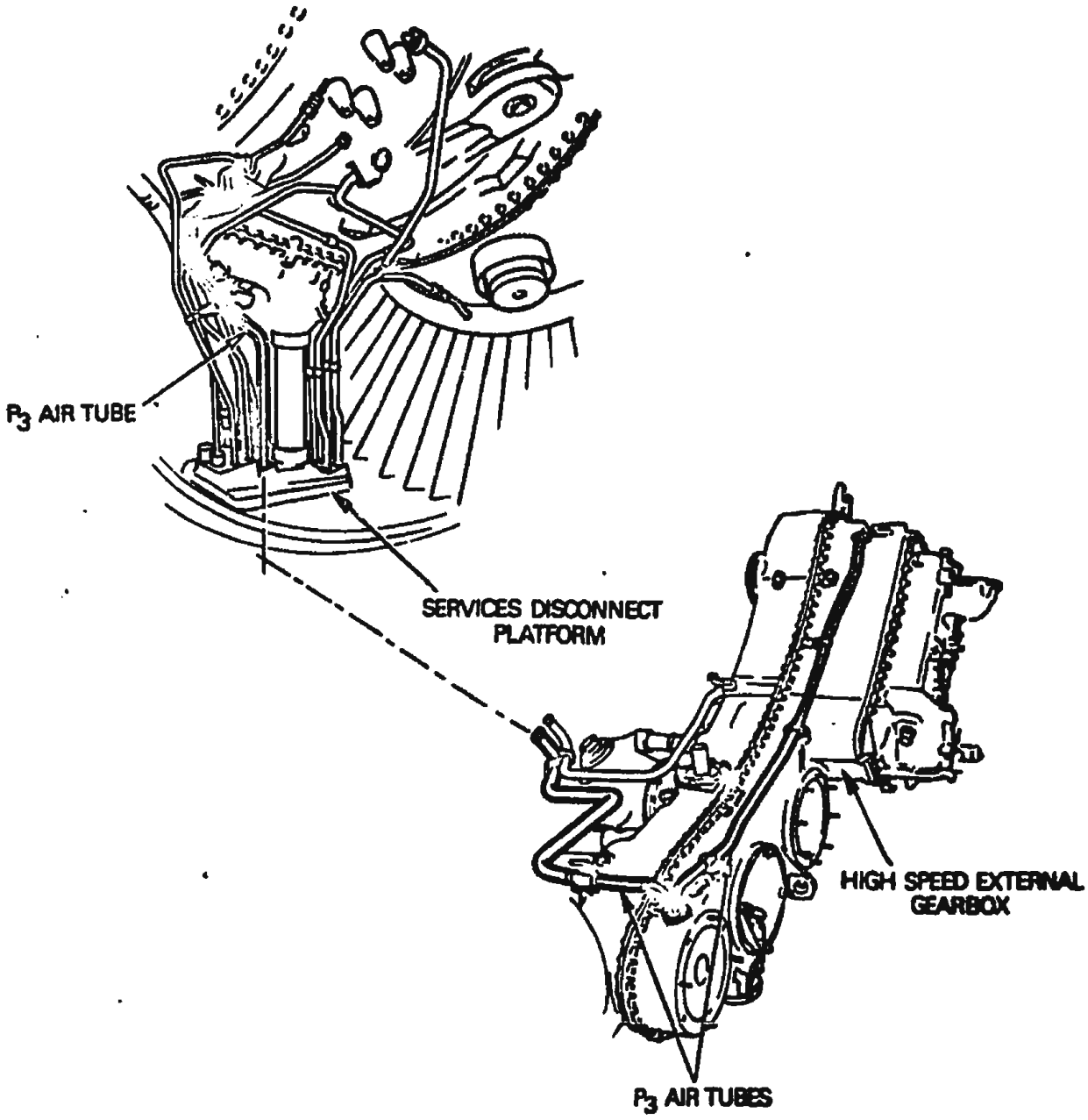
Component Location Index
Fig.101



Component Locator Diagram
Fig.102 (Sheet 1 of 3)



Component Locator Diagram
Fig.102 (Sheet 2 of 3)



Component Locator Diagram
Fig.102 (Sheet 3 of 3)

Notes to aid Fault Isolation:

CAUTION: MAKE SURE THE CALCULATED OIL CONSUMPTION IS NOT MORE THAN THE USABLE OIL AVAILABLE IN THE ENGINE FOR THE NEXT FLIGHT. THIS IS TO MAKE SURE THE ENGINE CAN COMPLETE THE FLIGHT WITH SUFFICIENT OIL.

1. Blue smoke from engine exhaust following engine shut-down is not cause for engine removal. This is normally caused by a small quantity of oil escaping from the H.P./I.P. bearing compartment when the sealing air pressure decays on engine shut-down.

C 2. Inlet and Exhaust Oil Puddling

C A. Inherent qualities of the RB211 oil system occasionally result in oil puddling in the inlet and exhaust areas after shutdown. This is primarily due to poor scavenging of the inlet and exhaust at engine shutdown. Depending on shutdown procedure or scavenge pump efficiency, oil may be prevalent on one flight and absent on the next. While this is a judgement factor, the key to oil in the inlet and exhaust is oil consumption.

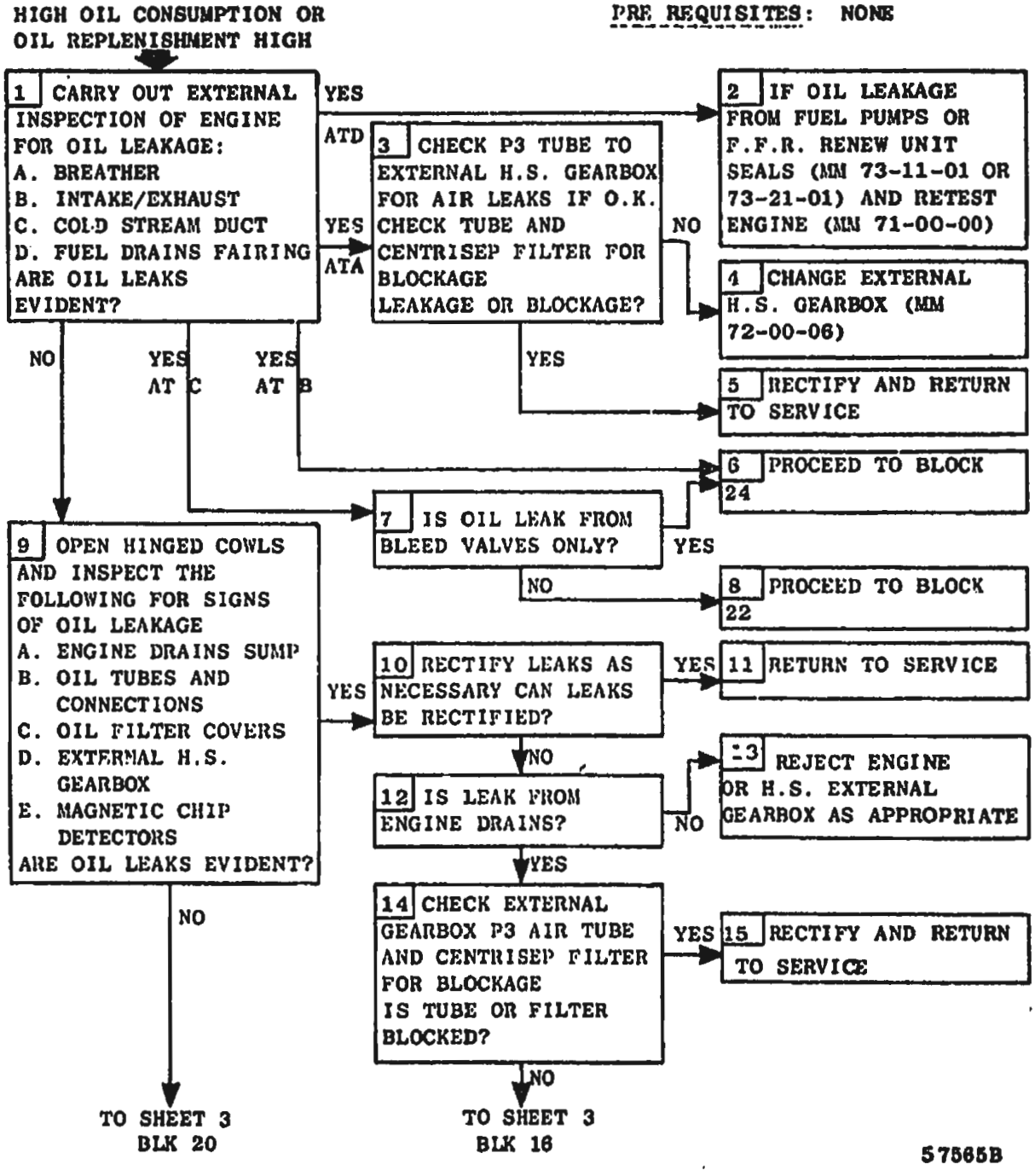
C B. When oil is noted in the inlet or exhaust of more than 0.5 pint, consider it excessive and investigate the cause. Refer to FIRM H.O.C. troubleshooting. Oil of less than a cup with no increase in consumption or abnormal oil adds may be signed off by noting condition and there is no abnormal oil adds or consumption.

R 3. Oil wetness in the spinner and engine inlet area can occur following engine shut down. This is usually a result of a small quantity of oil escaping from the front bearing housing under adverse sealing conditions. Provided the engine oil consumption is within limits and does not indicate a developing problem, and all other parameters are normal, the engine can continue in service.

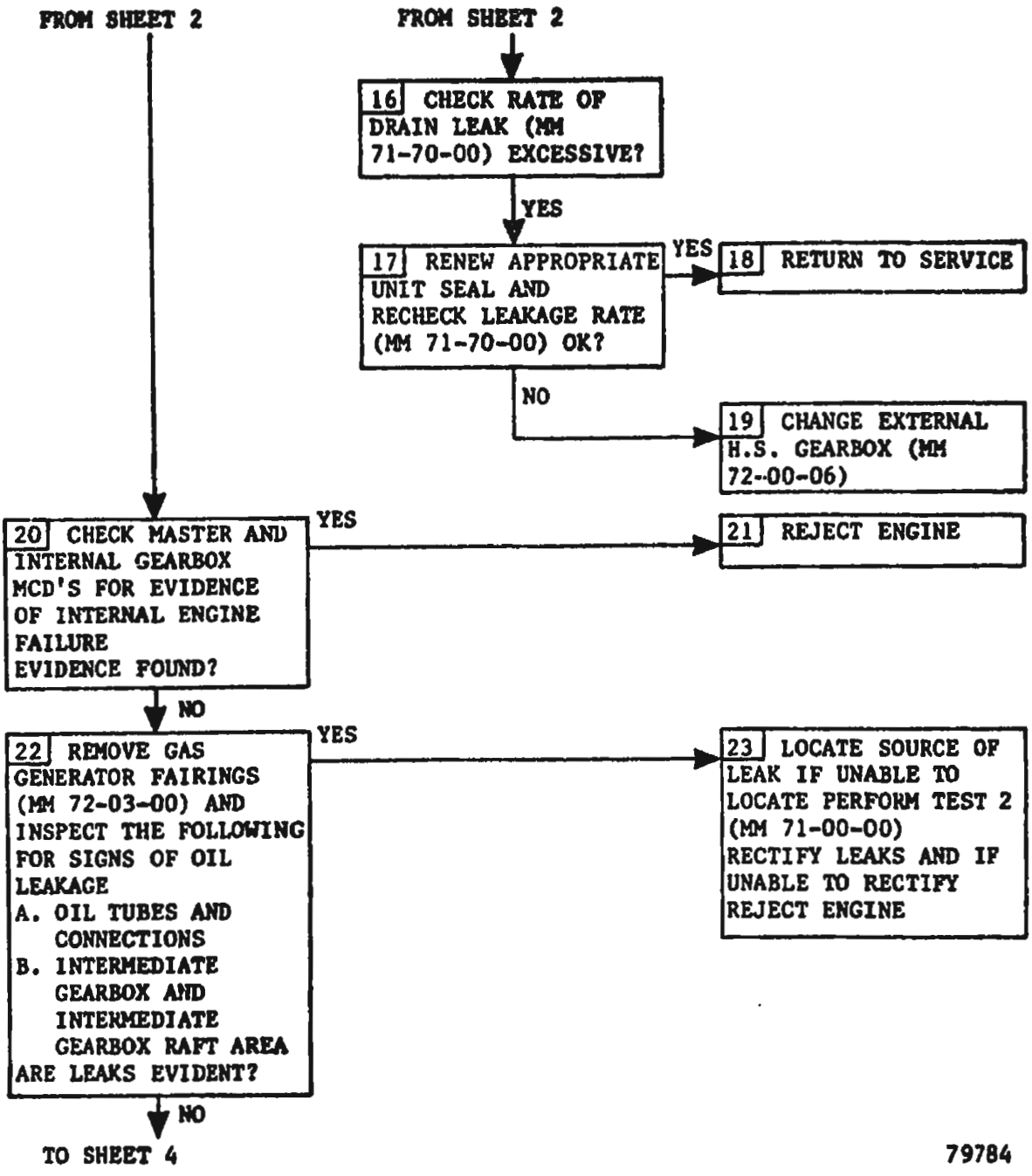
CR 4. Oil Hiding in HS Gearbox

CR A. Gearbox will normally contain 4 to 6 quarts of oil. More than this amount indicates a scavenge problem on shutdown. When troubleshooting, it is important to first fill the oil tank or verify it is in fact full, drain gear box and motorize engine. Then reservice oil tank to insure proper oil in gearbox and in tank.

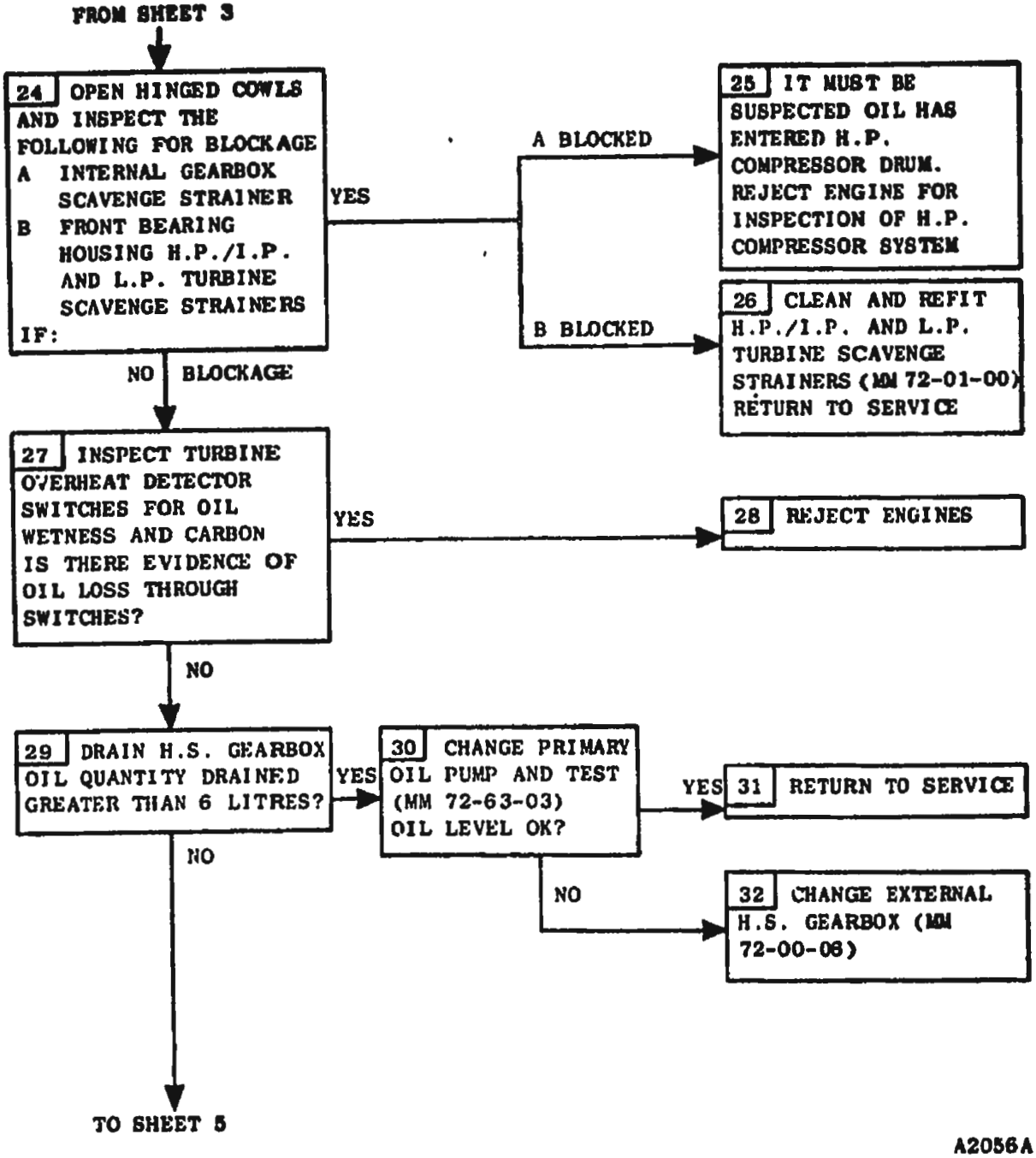
High oil consumption or oil replenishment high
Fig.103 (Sheet 1 of 5)


HIGH OIL CONSUMPTION OR OIL REPLENISHMENT HIGH
PRE REQUISITES: NONE
1 CARRY OUT EXTERNAL INSPECTION OF ENGINE FOR OIL LEAKAGE: A. BREATHER B. INTAKE/EXHAUST C. COLD STREAM DUCT D. FUEL DRAINS FAIRING ARE OIL LEAKS EVIDENT?
YES
2 IF OIL LEAKAGE FROM FUEL PUMPS OR F.F.R. RENEW UNIT SEALS (MM 73-11-01 OR 73-21-01) AND RETEST ENGINE (MM 71-00-00)
ATD
YES
ATA
3 CHECK P3 TUBE TO EXTERNAL H.S. GEARBOX FOR AIR LEAKS IF O.K. CHECK TUBE AND CENTRISEP FILTER FOR BLOCKAGE LEAKAGE OR BLOCKAGE?
NO
4 CHANGE EXTERNAL H.S. GEARBOX (MM 72-00-06)
YES
5 RECTIFY AND RETURN TO SERVICE
NO
YES AT C
YES AT B
6 PROCEED TO BLOCK 24
7 IS OIL LEAK FROM BLEED VALVES ONLY?
YES
NO
8 PROCEED TO BLOCK 22
9 OPEN HINGED COWLS AND INSPECT THE FOLLOWING FOR SIGNS OF OIL LEAKAGE A. ENGINE DRAINS SUMP B. OIL TUBES AND CONNECTIONS C. OIL FILTER COVERS D. EXTERNAL H.S. GEARBOX E. MAGNETIC CHIP DETECTORS ARE OIL LEAKS EVIDENT?
YES
10 RECTIFY LEAKS AS NECESSARY CAN LEAKS BE RECTIFIED?
YES
11 RETURN TO SERVICE
NO
12 IS LEAK FROM ENGINE DRAINS?
NO
13 REJECT ENGINE OR H.S. EXTERNAL GEARBOX AS APPROPRIATE
YES
14 CHECK EXTERNAL GEARBOX P3 AIR TUBE AND CENTRISEP FILTER FOR BLOCKAGE IS TUBE OR FILTER BLOCKED?
YES
15 RECTIFY AND RETURN TO SERVICE
NO
NO
TO SHEET 3 BLK 20
TO SHEET 3 BLK 16
57565B

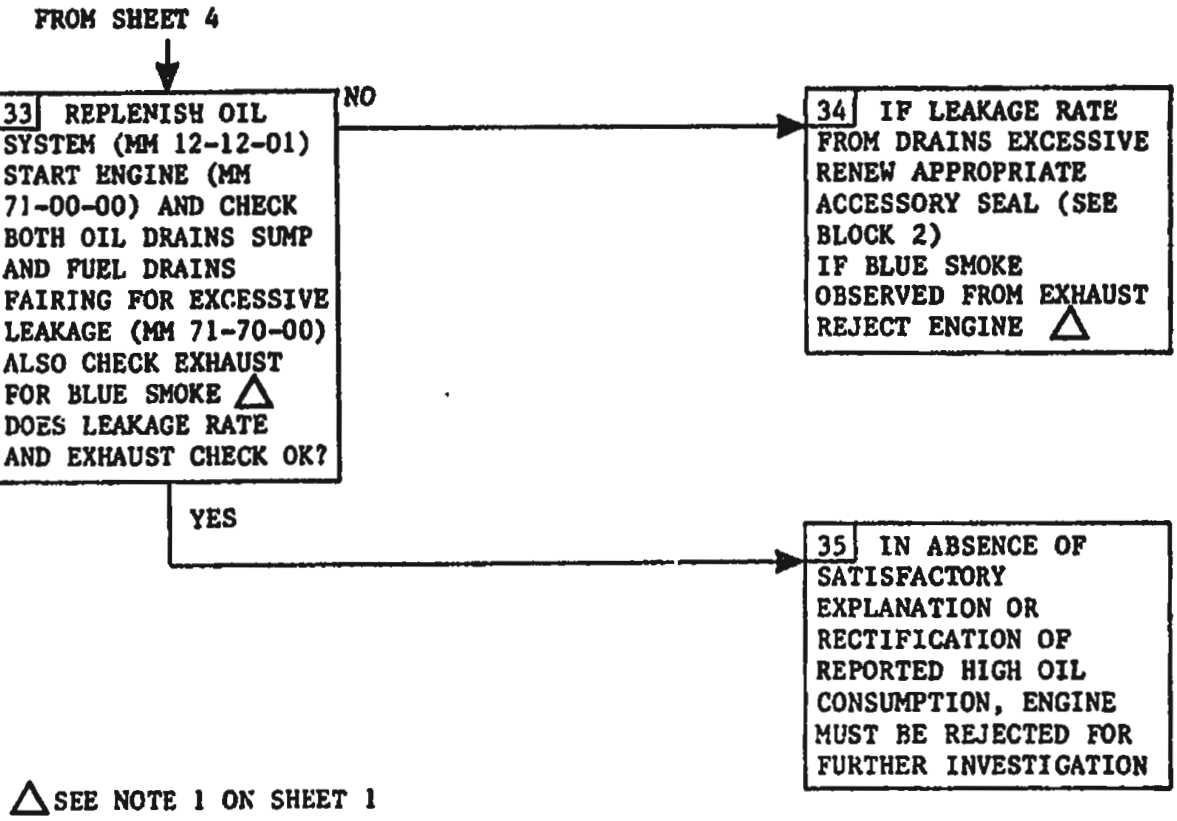
R High oil consumption or oil replenishment high
R Fig.103 (Sheet 2 of 5)


FROM SHEET 2
FROM SHEET 2
16 CHECK RATE OF DRAIN LEAK (MM 71-70-00) EXCESSIVE?
YES
17 RENEW APPROPRIATE UNIT SEAL AND RECHECK LEAKAGE RATE (MM 71-70-00) OK?
YES
18 RETURN TO SERVICE
NO
19 CHANGE EXTERNAL H.S. GEARBOX (MM 72-00-06)
20 CHECK MASTER AND INTERNAL GEARBOX MCD'S FOR EVIDENCE OF INTERNAL ENGINE FAILURE EVIDENCE FOUND?
YES
21 REJECT ENGINE
NO
22 REMOVE GAS GENERATOR FAIRINGS (MM 72-03-00) AND INSPECT THE FOLLOWING FOR SIGNS OF OIL LEAKAGE
A. OIL TUBES AND CONNECTIONS
B. INTERMEDIATE GEARBOX AND INTERMEDIATE GEARBOX RAFT AREA
ARE LEAKS EVIDENT?
YES
23 LOCATE SOURCE OF LEAK IF UNABLE TO LOCATE PERFORM TEST 2 (MM 71-00-00) RECTIFY LEAKS AND IF UNABLE TO RECTIFY REJECT ENGINE
NO
TO SHEET 4
79784

R High oil consumption or oil replenishment high
R Fig.103 (Sheet 3 of 5)

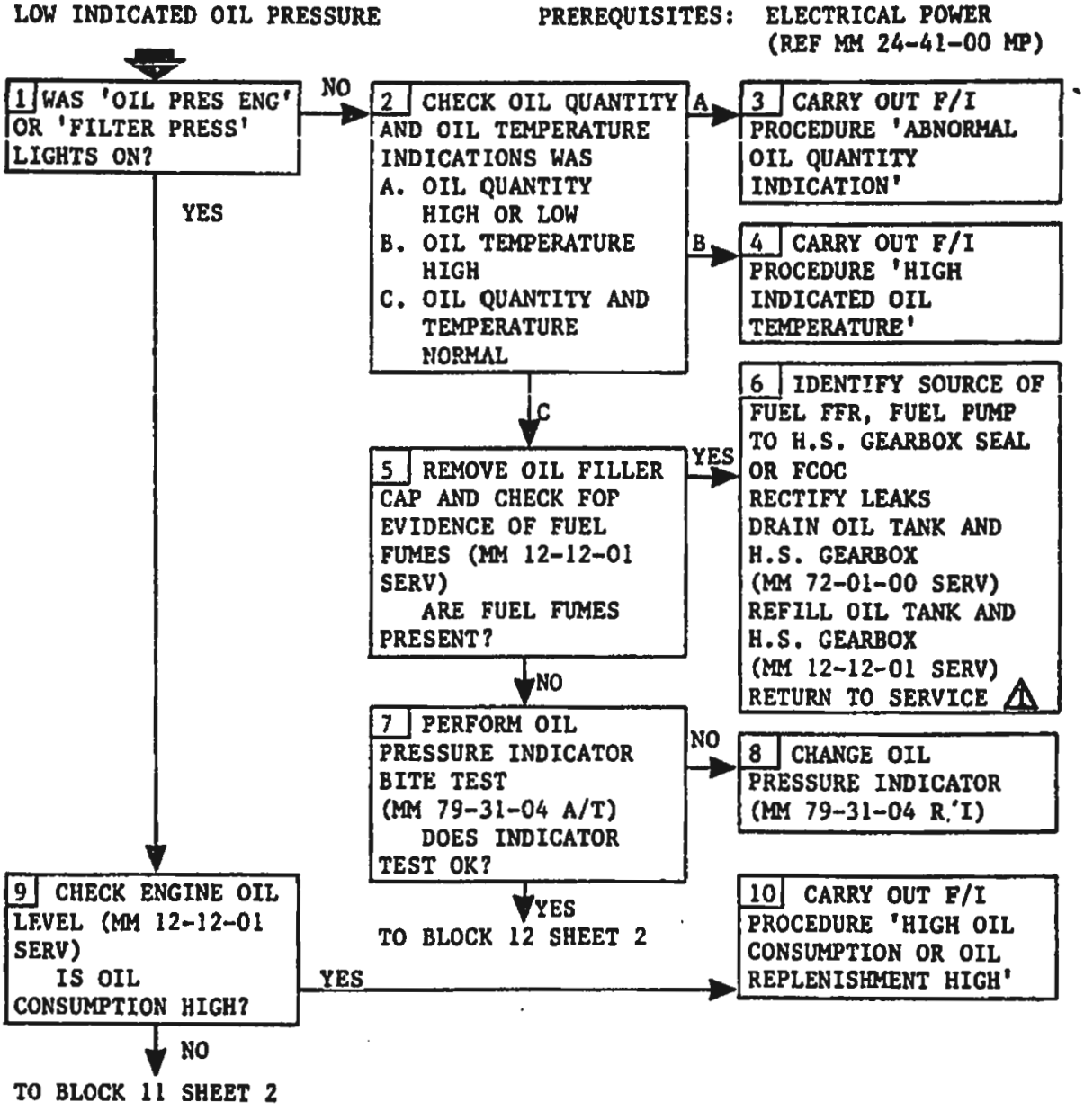

FROM SHEET 3
24 OPEN HINGED COWLS AND INSPECT THE FOLLOWING FOR BLOCKAGE
A INTERNAL GEARBOX SCAVENGE STRAINER
B FRONT BEARING HOUSING H.P./I.P. AND L.P. TURBINE SCAVENGE STRAINERS
IF:
YES
A BLOCKED
25 IT MUST BE SUSPECTED OIL HAS ENTERED H.P. COMPRESSOR DRUM. REJECT ENGINE FOR INSPECTION OF H.P. COMPRESSOR SYSTEM
B BLOCKED
26 CLEAN AND REFIT H.P./I.P. AND L.P. TURBINE SCAVENGE STRAINERS (MM 72-01-00) RETURN TO SERVICE
NO BLOCKAGE
27 INSPECT TURBINE OVERHEAT DETECTOR SWITCHES FOR OIL WETNESS AND CARBON IS THERE EVIDENCE OF OIL LOSS THROUGH SWITCHES?
YES
28 REJECT ENGINES
NO
29 DRAIN H.S. GEARBOX OIL QUANTITY DRAINED GREATER THAN 6 LITRES?
YES
30 CHANGE PRIMARY OIL PUMP AND TEST (MM 72-63-03) OIL LEVEL OK?
YES
31 RETURN TO SERVICE
NO
32 CHANGE EXTERNAL H.S. GEARBOX (MM 72-00-06)
NO
TO SHEET 5
A2056A

R High oil consumption or oil replenishment high
R Fig.103 (Sheet 4 of 5)

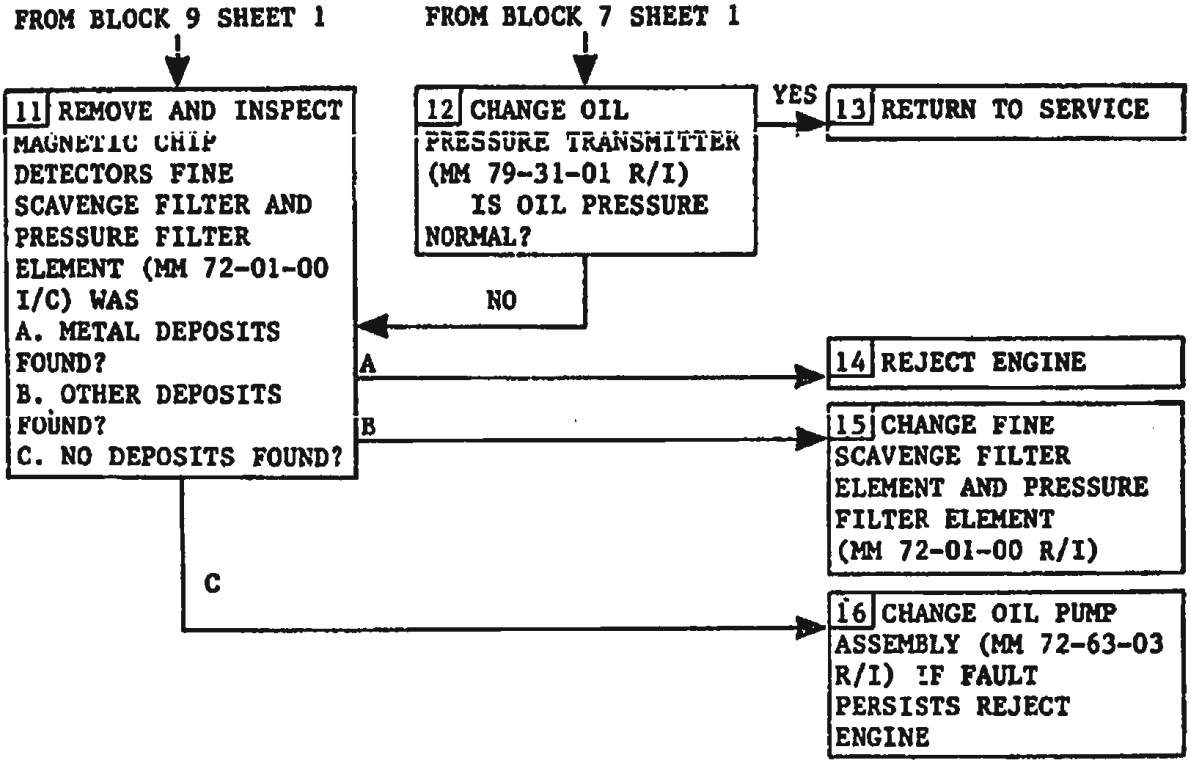

FROM SHEET 4
33 REPLENISH OIL SYSTEM (MM 12-12-01) START ENGINE (MM 71-00-00) AND CHECK BOTH OIL DRAINS SUMP AND FUEL DRAINS FAIRING FOR EXCESSIVE LEAKAGE (MM 71-70-00) ALSO CHECK EXHAUST FOR BLUE SMOKE △ DOES LEAKAGE RATE AND EXHAUST CHECK OK?
NO
34 IF LEAKAGE RATE FROM DRAINS EXCESSIVE RENEW APPROPRIATE ACCESSORY SEAL (SEE BLOCK 2) IF BLUE SMOKE OBSERVED FROM EXHAUST REJECT ENGINE △
YES
35 IN ABSENCE OF SATISFACTORY EXPLANATION OR RECTIFICATION OF REPORTED HIGH OIL CONSUMPTION, ENGINE MUST BE REJECTED FOR FURTHER INVESTIGATION
△ SEE NOTE 1 ON SHEET 1

A2057A

R High oil consumption or oil replenishment high
R Fig.103 (Sheet 5 of 5)

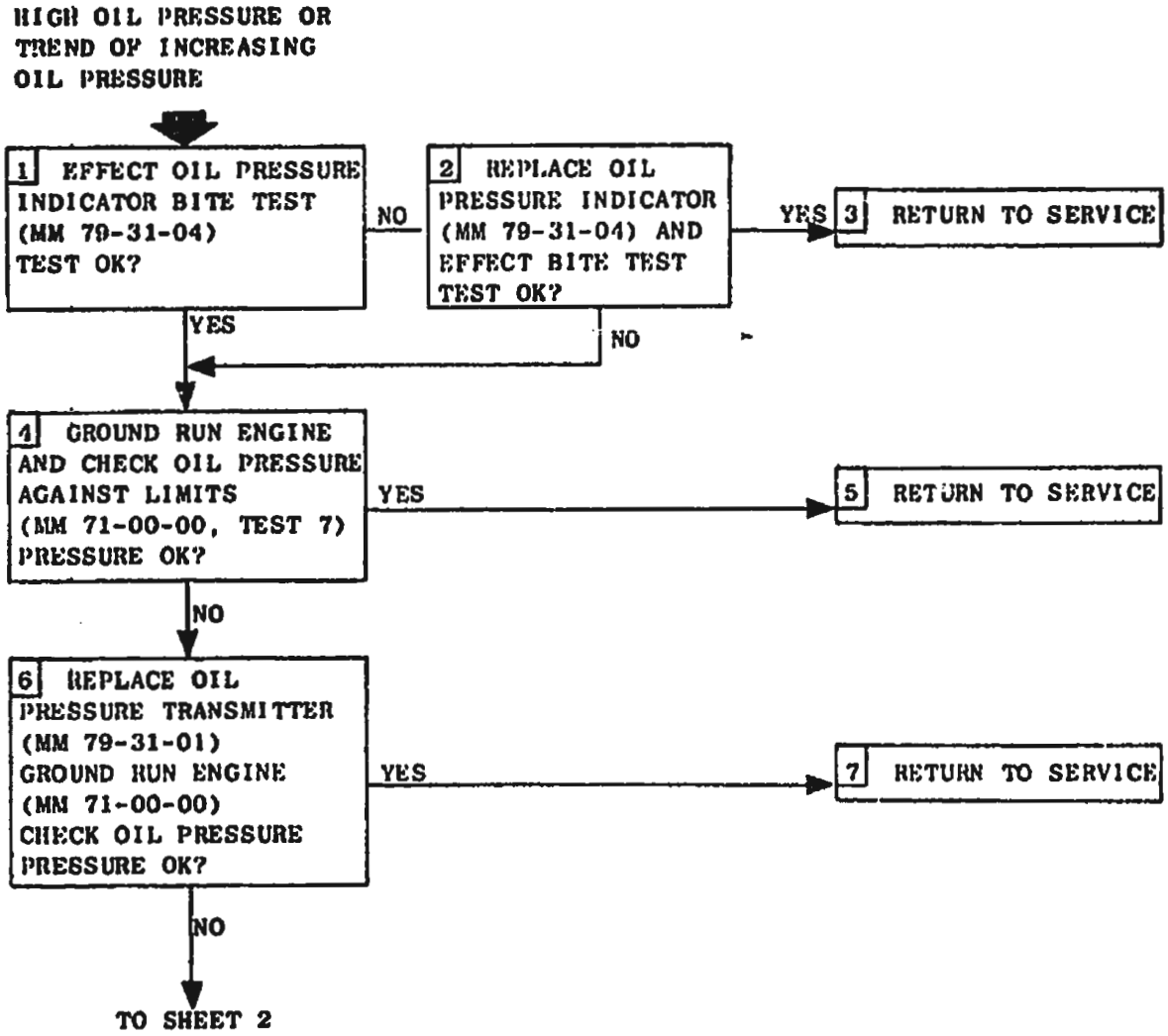

LOW INDICATED OIL PRESSURE
PREREQUISITES: ELECTRICAL POWER (REF MM 24-41-00 MP)
1 WAS 'OIL PRES ENG' OR 'FILTER PRESS' LIGHTS ON?
NO
YES
2 CHECK OIL QUANTITY AND OIL TEMPERATURE INDICATIONS WAS
A. OIL QUANTITY HIGH OR LOW
B. OIL TEMPERATURE HIGH
C. OIL QUANTITY AND TEMPERATURE NORMAL
A
B
C
3 CARRY OUT F/I PROCEDURE 'ABNORMAL OIL QUANTITY INDICATION'
4 CARRY OUT F/I PROCEDURE 'HIGH INDICATED OIL TEMPERATURE'
5 REMOVE OIL FILLER CAP AND CHECK FOP EVIDENCE OF FUEL FUMES (MM 12-12-01 SERV)
ARE FUEL FUMES PRESENT?
YES
NO
6 IDENTIFY SOURCE OF FUEL FFR, FUEL PUMP TO H.S. GEARBOX SEAL OR FCOC
RECTIFY LEAKS
DRAIN OIL TANK AND H.S. GEARBOX (MM 72-01-00 SERV)
REFILL OIL TANK AND H.S. GEARBOX (MM 12-12-01 SERV)
RETURN TO SERVICE ⚠
7 PERFORM OIL PRESSURE INDICATOR BITE TEST (MM 79-31-04 A/T)
DOES INDICATOR TEST OK?
NO
YES
8 CHANGE OIL PRESSURE INDICATOR (MM 79-31-04 R/I)
TO BLOCK 12 SHEET 2
9 CHECK ENGINE OIL LEVEL (MM 12-12-01 SERV)
IS OIL CONSUMPTION HIGH?
YES
NO
10 CARRY OUT F/I PROCEDURE 'HIGH OIL CONSUMPTION OR OIL REPLENISHMENT HIGH'
TO BLOCK 11 SHEET 2
⚠ CHECK AND RECORD MAGNETIC CHIP DETECTORS BEFORE AND AFTER NEXT FLIGHT
36692E

R
R
Low indicated oil pressure
Fig.104 (Sheet 1 of 2)


FROM BLOCK 9 SHEET 1
FROM BLOCK 7 SHEET 1
11 REMOVE AND INSPECT MAGNETIC CHIP DETECTORS FINE SCAVENGE FILTER AND PRESSURE FILTER ELEMENT (MM 72-01-00 I/C) WAS
A. METAL DEPOSITS FOUND?
B. OTHER DEPOSITS FOUND?
C. NO DEPOSITS FOUND?
12 CHANGE OIL PRESSURE TRANSMITTER (MM 79-31-01 R/I) IS OIL PRESSURE NORMAL?
YES
13 RETURN TO SERVICE
NO
A
14 REJECT ENGINE
B
15 CHANGE FINE SCAVENGE FILTER ELEMENT AND PRESSURE FILTER ELEMENT (MM 72-01-00 R/I)
C
16 CHANGE OIL PUMP ASSEMBLY (MM 72-63-03 R/I) IF FAULT PERSISTS REJECT ENGINE

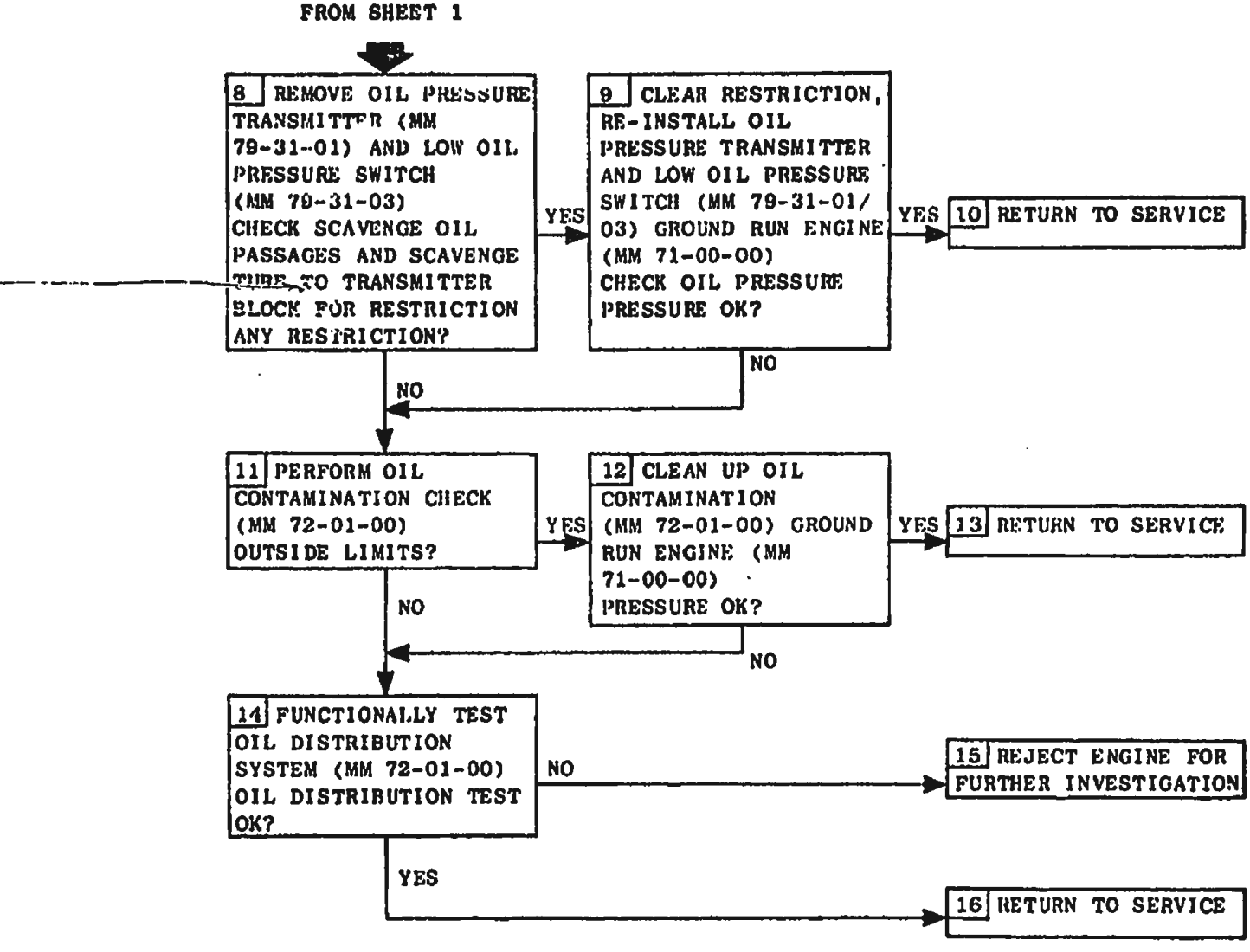
A2049A

R Low indicated oil pressure
R Fig.104 (Sheet 2 of 2)


HIGH OIL PRESSURE OR TREND OF INCREASING OIL PRESSURE
1 EFFECT OIL PRESSURE INDICATOR BITE TEST (MM 79-31-04) TEST OK?
NO
2 REPLACE OIL PRESSURE INDICATOR (MM 79-31-04) AND EFFECT BITE TEST TEST OK?
YES
3 RETURN TO SERVICE
YES
NO
4 GROUND RUN ENGINE AND CHECK OIL PRESSURE AGAINST LIMITS (MM 71-00-00, TEST 7) PRESSURE OK?
YES
5 RETURN TO SERVICE
NO
6 REPLACE OIL PRESSURE TRANSMITTER (MM 79-31-01) GROUND RUN ENGINE (MM 71-00-00) CHECK OIL PRESSURE PRESSURE OK?
YES
7 RETURN TO SERVICE
NO
TO SHEET 2

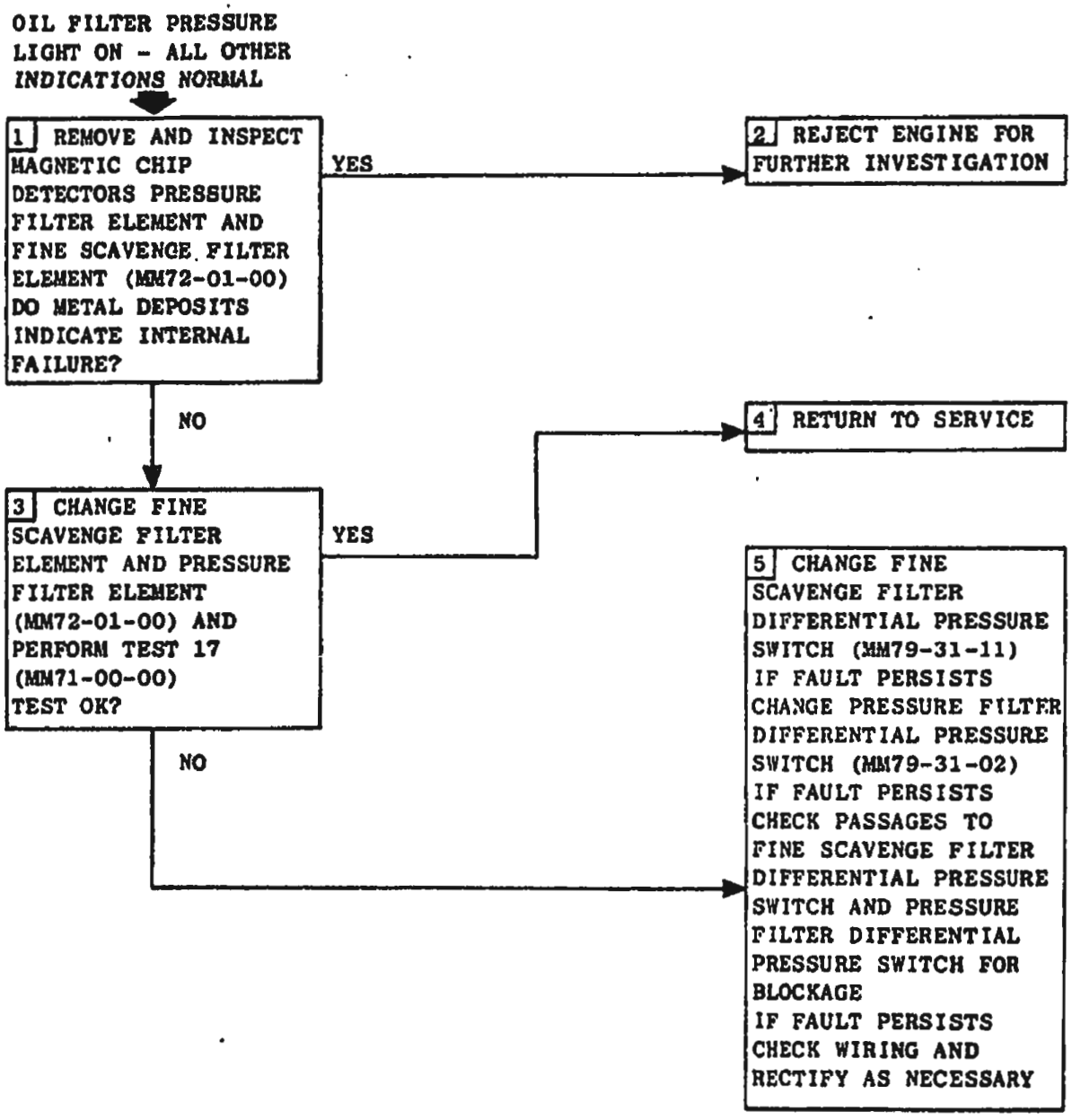
79716

Trend shows oil pressure increasing
Fig.105 (Sheet 1 of 2)

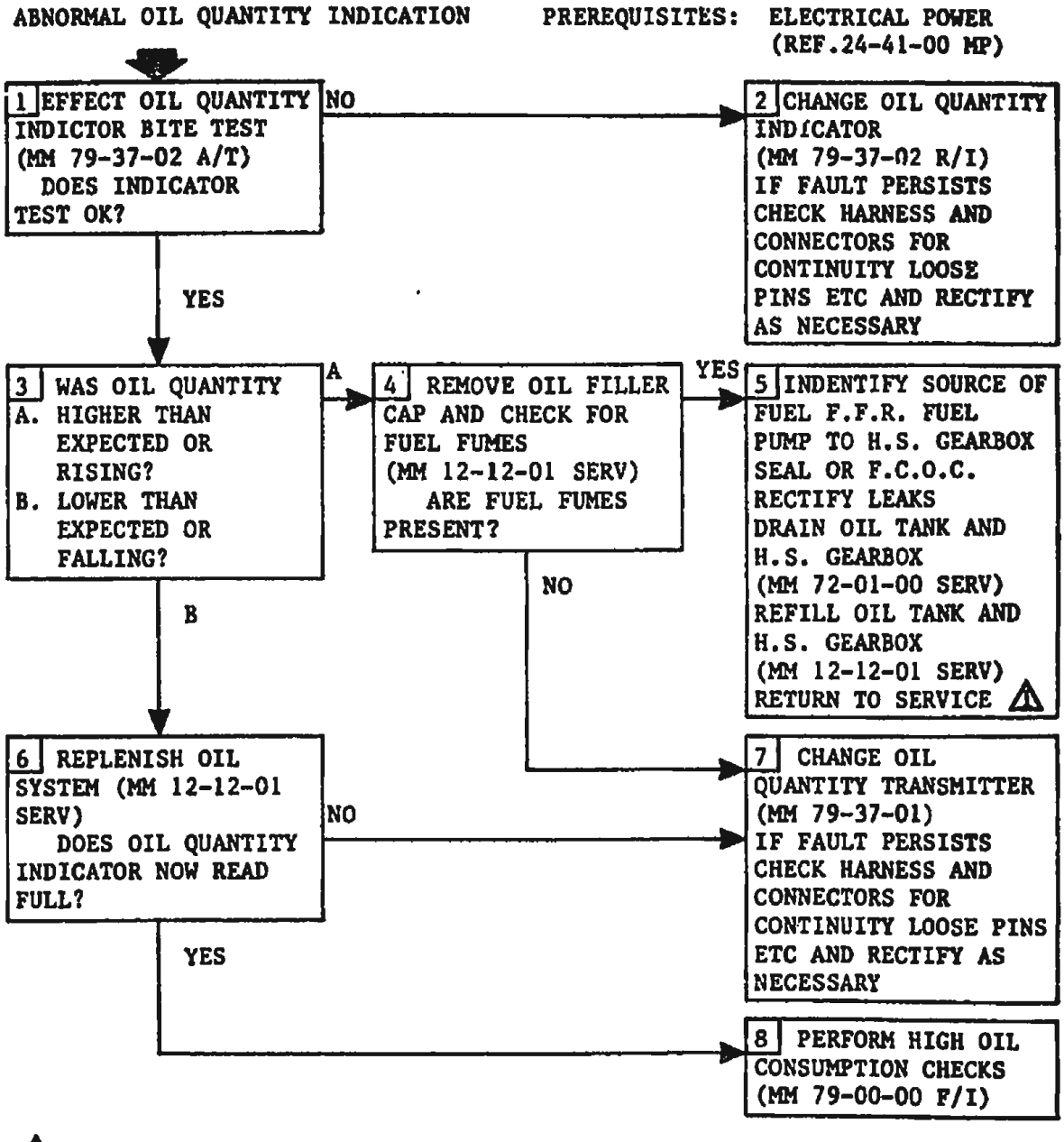

FROM SHEET 1
8 REMOVE OIL PRESSURE TRANSMITTER (MM 79-31-01) AND LOW OIL PRESSURE SWITCH (MM 79-31-03) CHECK SCAVENGE OIL PASSAGES AND SCAVENGE TUBE TO TRANSMITTER BLOCK FOR RESTRICTION ANY RESTRICTION?
YES
9 CLEAR RESTRICTION, RE-INSTALL OIL PRESSURE TRANSMITTER AND LOW OIL PRESSURE SWITCH (MM 79-31-01/03) GROUND RUN ENGINE (MM 71-00-00) CHECK OIL PRESSURE PRESSURE OK?
YES
10 RETURN TO SERVICE
NO
NO
11 PERFORM OIL CONTAMINATION CHECK (MM 72-01-00) OUTSIDE LIMITS?
YES
12 CLEAN UP OIL CONTAMINATION (MM 72-01-00) GROUND RUN ENGINE (MM 71-00-00) PRESSURE OK?
YES
13 RETURN TO SERVICE
NO
NO
14 FUNCTIONALLY TEST OIL DISTRIBUTION SYSTEM (MM 72-01-00) OIL DISTRIBUTION TEST OK?
NO
15 REJECT ENGINE FOR FURTHER INVESTIGATION
YES
16 RETURN TO SERVICE

79719

Trend shows oil pressure increasing
Fig.105 (Sheet 2 of 2)

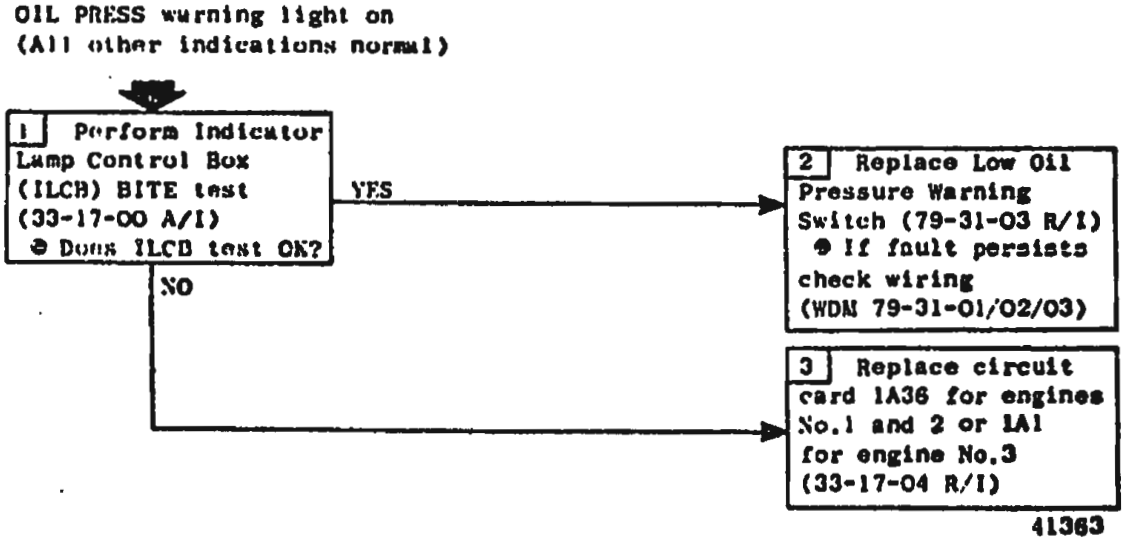

OIL FILTER PRESSURE LIGHT ON - ALL OTHER INDICATIONS NORMAL
1 REMOVE AND INSPECT MAGNETIC CHIP DETECTORS PRESSURE FILTER ELEMENT AND FINE SCAVENGE FILTER ELEMENT (MM72-01-00) DO METAL DEPOSITS INDICATE INTERNAL FAILURE?
YES
2 REJECT ENGINE FOR FURTHER INVESTIGATION
NO
3 CHANGE FINE SCAVENGE FILTER ELEMENT AND PRESSURE FILTER ELEMENT (MM72-01-00) AND PERFORM TEST 17 (MM71-00-00) TEST OK?
YES
4 RETURN TO SERVICE
NO
5 CHANGE FINE SCAVENGE FILTER DIFFERENTIAL PRESSURE SWITCH (MM79-31-11) IF FAULT PERSISTS CHANGE PRESSURE FILTER DIFFERENTIAL PRESSURE SWITCH (MM79-31-02) IF FAULT PERSISTS CHECK PASSAGES TO FINE SCAVENGE FILTER DIFFERENTIAL PRESSURE SWITCH AND PRESSURE FILTER DIFFERENTIAL PRESSURE SWITCH FOR BLOCKAGE IF FAULT PERSISTS CHECK WIRING AND RECTIFY AS NECESSARY
34559E

Oil FILTER PRESSURE light 'ON' (All other indications normal)
Fig.106

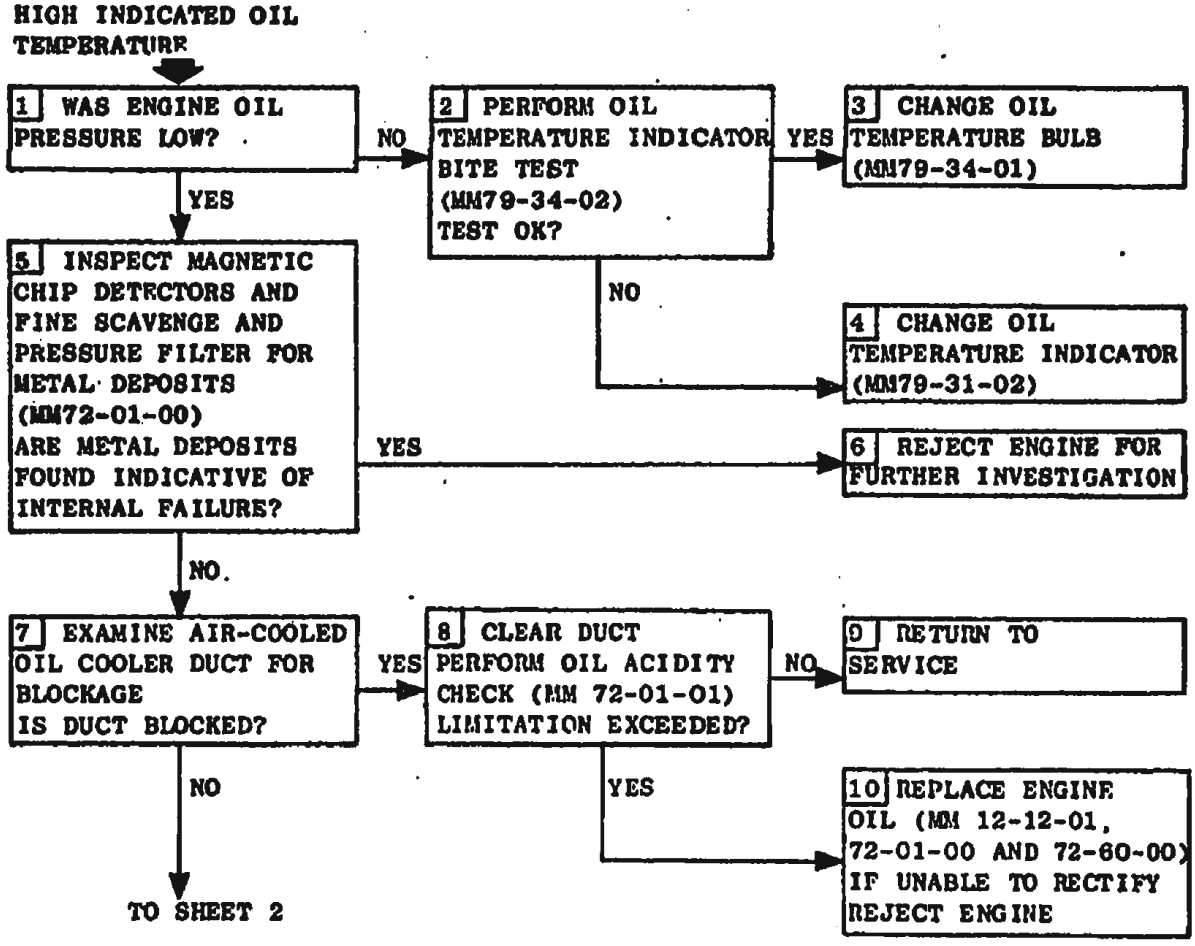

ABNORMAL OIL QUANTITY INDICATION
PREREQUISITES: ELECTRICAL POWER (REF.24-41-00 MP)
1 EFFECT OIL QUANTITY INDICTOR BITE TEST (MM 79-37-02 A/T) DOES INDICATOR TEST OK?
NO
2 CHANGE OIL QUANTITY INDICATOR (MM 79-37-02 R/I) IF FAULT PERSISTS CHECK HARNESS AND CONNECTORS FOR CONTINUITY LOOSE PINS ETC AND RECTIFY AS NECESSARY
YES
3 WAS OIL QUANTITY A. HIGHER THAN EXPECTED OR RISING? B. LOWER THAN EXPECTED OR FALLING?
A
4 REMOVE OIL FILLER CAP AND CHECK FOR FUEL FUMES (MM 12-12-01 SERV) ARE FUEL FUMES PRESENT?
YES
5 INDENTIFY SOURCE OF FUEL F.F.R. FUEL PUMP TO H.S. GEARBOX SEAL OR F.C.O.C. RECTIFY LEAKS DRAIN OIL TANK AND H.S. GEARBOX (MM 72-01-00 SERV) REFILL OIL TANK AND H.S. GEARBOX (MM 12-12-01 SERV) RETURN TO SERVICE ⚠
NO
B
6 REPLENISH OIL SYSTEM (MM 12-12-01 SERV) DOES OIL QUANTITY INDICATOR NOW READ FULL?
NO
7 CHANGE OIL QUANTITY TRANSMITTER (MM 79-37-01) IF FAULT PERSISTS CHECK HARNESS AND CONNECTORS FOR CONTINUITY LOOSE PINS ETC AND RECTIFY AS NECESSARY
YES
8 PERFORM HIGH OIL CONSUMPTION CHECKS (MM 79-00-00 F/I)
⚠ CHECK AND RECORD MAGNETIC CHIP DETECTORS BEFORE AND AFTER NEXT FLIGHT
57514D

R R Abnormal oil quantity indication
Fig.107

EFFECTIVITY: ALL

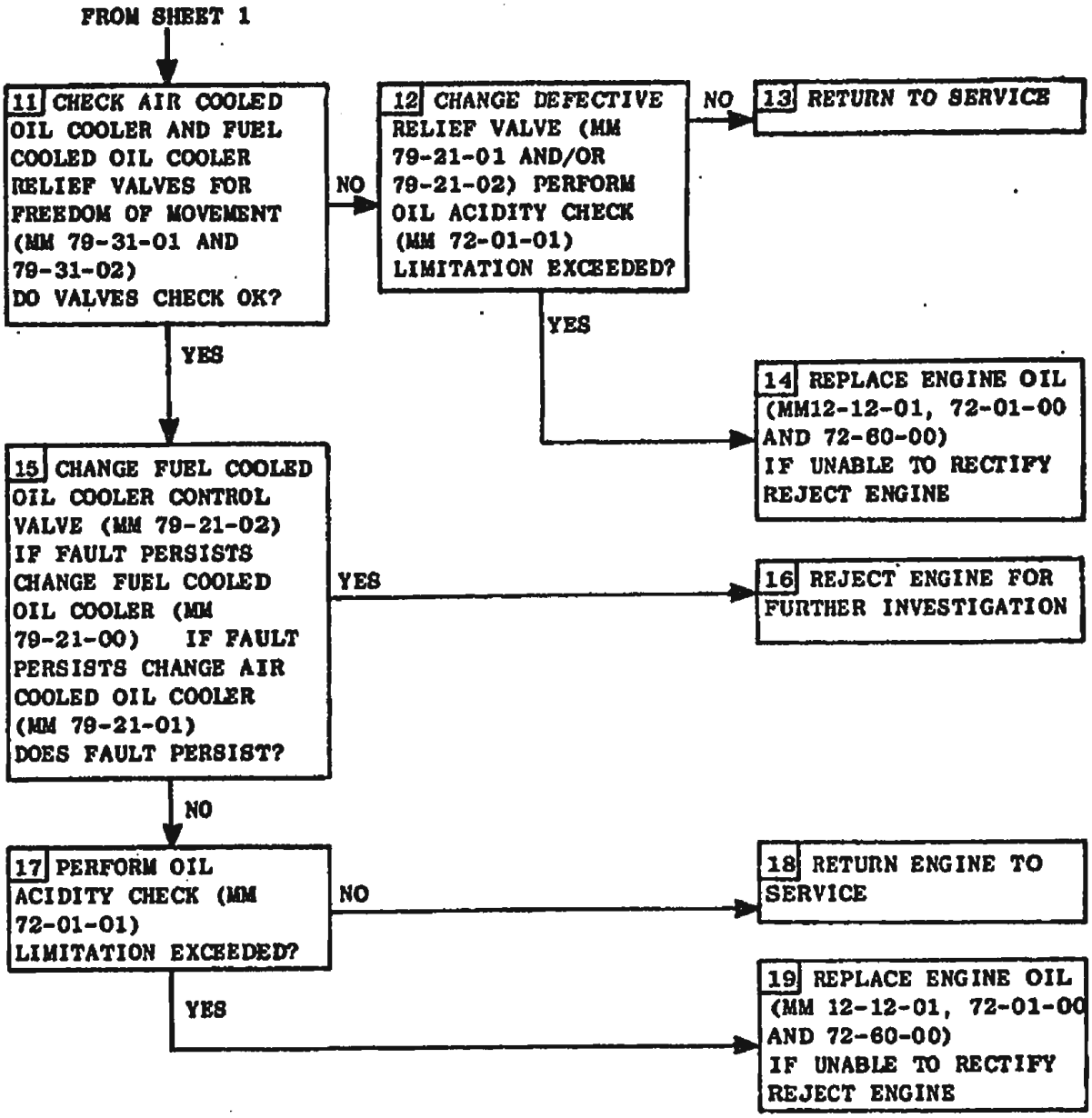

OIL PRESS warning light on
(All other indications normal)
1 Perform Indicator Lamp Control Box (ILCB) BITE test (33-17-00 A/I)
Does ILCB test OK?
YES
NO
2 Replace Low Oil Pressure Warning Switch (79-31-03 R/I)
If fault persists check wiring (WDM 79-31-01/02/03)
3 Replace circuit card 1A36 for engines No.1 and 2 or 1A1 for engine No.3 (33-17-04 R/I)
41363

OIL PRESS Warning light 'on' (all other indications normal)
Fig.108


HIGH INDICATED OIL TEMPERATURE
1 WAS ENGINE OIL PRESSURE LOW?
NO
2 PERFORM OIL TEMPERATURE INDICATOR BITE TEST (MM79-34-02) TEST OK?
YES
3 CHANGE OIL TEMPERATURE BULB (MM79-34-01)
YES
5 INSPECT MAGNETIC CHIP DETECTORS AND FINE SCAVENGE AND PRESSURE FILTER FOR METAL DEPOSITS (MM72-01-00) ARE METAL DEPOSITS FOUND INDICATIVE OF INTERNAL FAILURE?
NO
4 CHANGE OIL TEMPERATURE INDICATOR (MM79-31-02)
YES
6 REJECT ENGINE FOR FURTHER INVESTIGATION
NO.
7 EXAMINE AIR-COOLED OIL COOLER DUCT FOR BLOCKAGE IS DUCT BLOCKED?
YES
8 CLEAR DUCT PERFORM OIL ACIDITY CHECK (MM 72-01-01) LIMITATION EXCEEDED?
NO
9 RETURN TO SERVICE
NO
TO SHEET 2
YES
10 REPLACE ENGINE OIL (MM 12-12-01, 72-01-00 AND 72-60-00) IF UNABLE TO RECTIFY REJECT ENGINE

34561D

High indicated oil temperature
Fig.109 (Sheet 1 of 2)


FROM SHEET 1
11 CHECK AIR COOLED OIL COOLER AND FUEL COOLED OIL COOLER RELIEF VALVES FOR FREEDOM OF MOVEMENT (MM 79-31-01 AND 79-31-02) DO VALVES CHECK OK?
NO
12 CHANGE DEFECTIVE RELIEF VALVE (MM 79-21-01 AND/OR 79-21-02) PERFORM OIL ACIDITY CHECK (MM 72-01-01) LIMITATION EXCEEDED?
NO
13 RETURN TO SERVICE
YES
YES
14 REPLACE ENGINE OIL (MM12-12-01, 72-01-00 AND 72-60-00) IF UNABLE TO RECTIFY REJECT ENGINE
15 CHANGE FUEL COOLED OIL COOLER CONTROL VALVE (MM 79-21-02) IF FAULT PERSISTS CHANGE FUEL COOLED OIL COOLER (MM 79-21-00) IF FAULT PERSISTS CHANGE AIR COOLED OIL COOLER (MM 79-21-01) DOES FAULT PERSIST?
YES
16 REJECT ENGINE FOR FURTHER INVESTIGATION
NO
17 PERFORM OIL ACIDITY CHECK (MM 72-01-01) LIMITATION EXCEEDED?
NO
18 RETURN ENGINE TO SERVICE
YES
19 REPLACE ENGINE OIL (MM 12-12-01, 72-01-00 AND 72-60-00) IF UNABLE TO RECTIFY REJECT ENGINE
57582

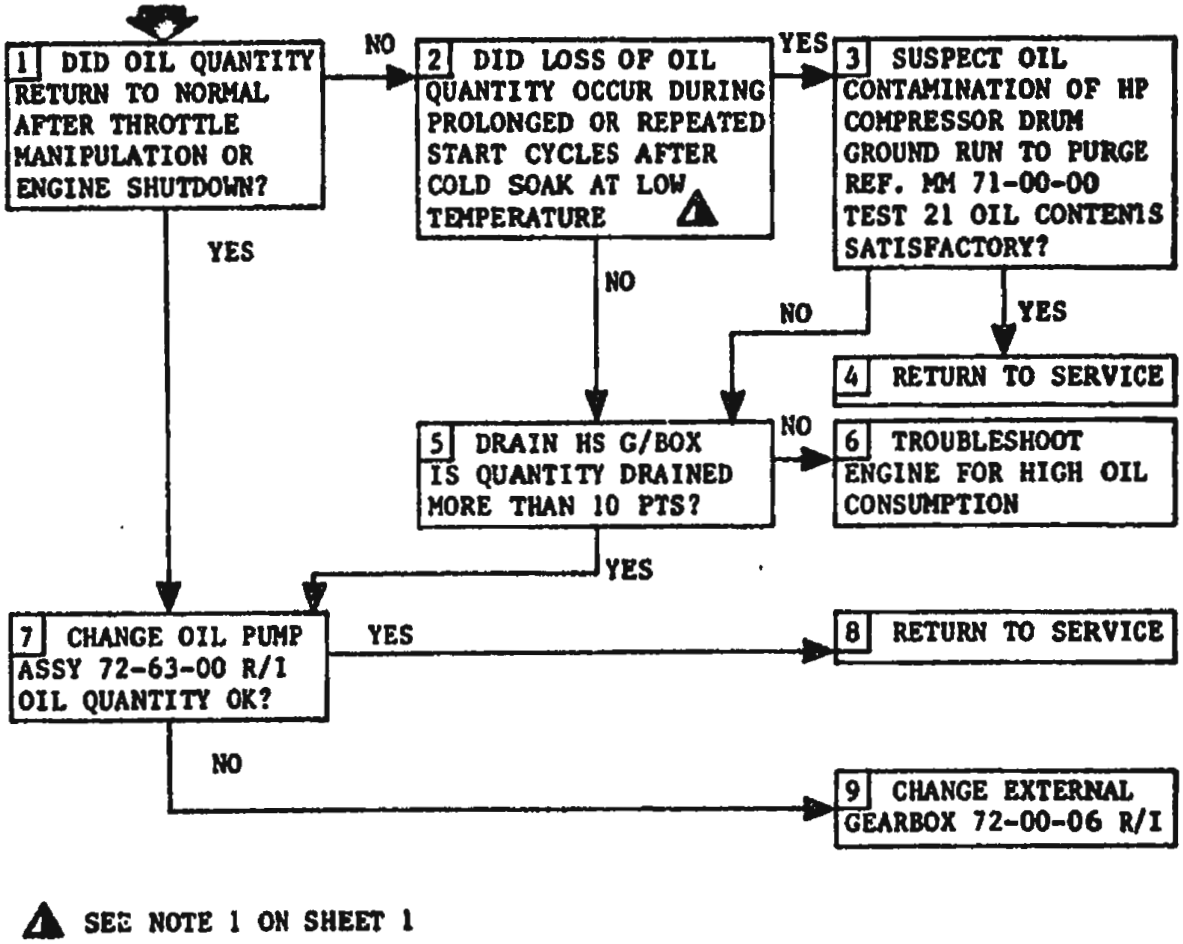
High indicated oil temperature
Fig.109 (Sheet 2 of 2)

1. A combination of cold soak at low temperatures and prolonged or repeated start cycles may be accompanied by a substantial loss of oil quantity. Should the oil quantity fail to recover, it must be assumed that oil has entered the H.P. Compressor drum. Under these oil loss circumstances only, it is permissible to purge the drum of oil by ground running (Ref. 71-00-00, Maintenance Practices, Test No.21).

2. In addition to the procedures detailed in Fig.110 (Sheet 2), failure to incorporate any one of the following Service Bulletins may result in oil hiding being exhibited:
SB 72-5517, SB 72-5581, SB 72-6342

Oil hiding (Severe loss of oil contents with/without pressure fluctuations)
Fig.110 (Sheet 1 of 2)

OIL HIDING
(SEVERE LOSS OF OIL CONTENTS
WITH/WITHOUT PRESSURE FLUCTUATIONS)


1 DID OIL QUANTITY RETURN TO NORMAL AFTER THROTTLE MANIPULATION OR ENGINE SHUTDOWN?
NO
2 DID LOSS OF OIL QUANTITY OCCUR DURING PROLONGED OR REPEATED START CYCLES AFTER COLD SOAK AT LOW TEMPERATURE ⚠
YES
3 SUSPECT OIL CONTAMINATION OF HP COMPRESSOR DRUM GROUND RUN TO PURGE REF. MM 71-00-00 TEST 21 OIL CONTENTS SATISFACTORY?
YES
NO
NO
4 RETURN TO SERVICE
5 DRAIN HS G/BOX IS QUANTITY DRAINED MORE THAN 10 PTS?
NO
6 TROUBLESHOOT ENGINE FOR HIGH OIL CONSUMPTION
YES
7 CHANGE OIL PUMP ASSY 72-63-00 R/1 OIL QUANTITY OK?
YES
8 RETURN TO SERVICE
NO
9 CHANGE EXTERNAL GEARBOX 72-00-06 R/I

⚠ SEE NOTE 1 ON SHEET 1

57513B

Oil hiding (Severe loss of oil contents, with/without pressure fluctuations)
Fig.110 (Sheet 2 of 2)

C 3. Trouble shooting oil smell (smoke) reports

A. After first report of oil smell, check APU load compressor for oil. Remove flexible duct at inlet to load compressor. If center hole in load compressor shows signs of oil, set up APU change. Placard APU inoperative until APU is changed.

B. On layover after first report operate ECU systems to burn out traces of oil smell.

(1) Start all engines and run at idle. (Standard MM procedure) Close manifold cross bleed valves.

(2) Pull CB 2N, 8N, & 14N on F/E aft CB panel (CB3). This will place all engines in flight idle.

(3) Leave cabin doors and cockpit exit open.

(4) Operate packs in manual mode - monitor ACM discharge temperature and cabin temperature. Open turbine bypass valve and operate at maximum temperature without tripping packs. (Packs will trip at 98 degrees C).

(5) Operate each pack at maximum for 15 minutes.

NOTE: If cockpit temperature becomes unbearable, it may be necessary to operate 1 or 2 packs on full cool while checking the 3rd.

(6) Reactivate CB 2N, 8N, & 14N and shutdown engines according to standard MM procedure.

(7) Replace all coalescer bags. (socks) Mark each bag by position (1,2, or 3).

(8) Return bags to MCIES, 1-410 MCI.

Trouble shooting oil smell (smoke) reports
Fig.111 (Sheet 1 of 2)

C. If smell persists after a further flight,

(1) Remove outlet duct from APU load compressor. Wipe inside of APU duct with a folded paper towel. Check towel for presence of oil.

(2) Mark towel with plane number and return to MCIEE, 1-408, MCI.

(3) Reconnect APU duct

(4) Remove both manifold cross bleed valves.

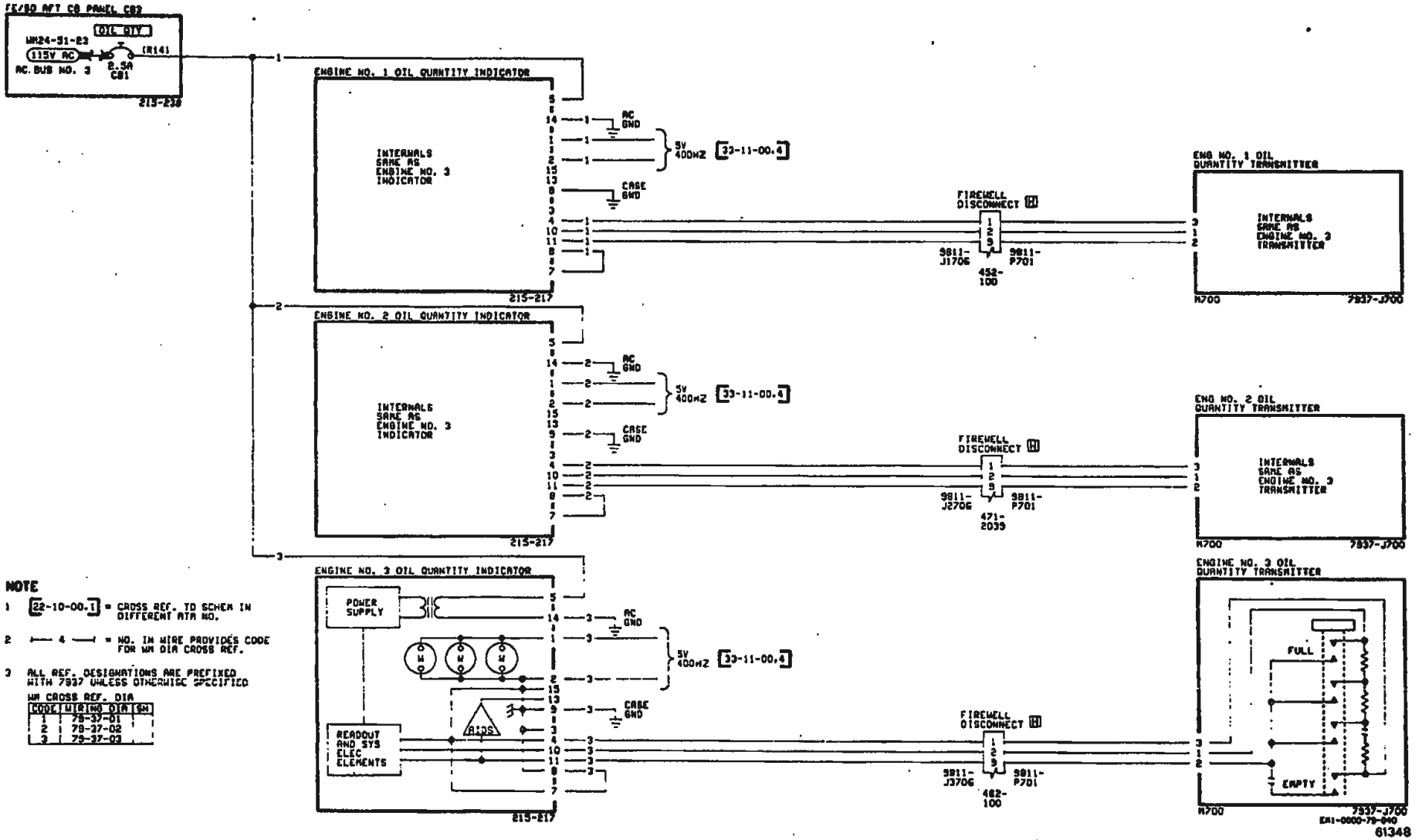
(5) Using a folded paper towel, wipe inside of each duct as it comes from the engine.

(6) Check towels for presence of oil. (Disregard black carbon soot. Check for fresh oil on back side of towel.) Mark each towel as to position and return to MCIEE, Shirley.

D. Based on findings in 2 above. MCIEE will schedule an APU or engine change.

E. After APU or engine change, item B above must be accomplished before aircraft returns to service.

Trouble shooting oil smell (smoke) reports
Fig.111 (Sheet 2 of 2)



NOTE

1. 22-10-00.1 = CROSS REF. TO SCHEM IN DIFFERENT ATA NO.
2. ⟵ 4 ⟶ = NO. IN WIRE PROVIDES CODE FOR WM DIA CROSS REF.
3. ALL REF. DESIGNATIONS ARE PREFIXED WITH 7937 UNLESS OTHERWISE SPECIFIED

WM CROSS REF. DIA

CODE	WIRING DIA	SH
1	79-37-01	
2	79-37-02	
3	79-37-03	

Oil Quantity Indicating System Schematic
Fig.112

OIL - DISTRIBUTION SYSTEM

1. General

Oil is distributed through the system by gear-type pressure and scavenge pumps positioned in the high-speed external gearbox. To maintain an effective operating temperature of the oil, an air cooled and a fuel cooled oil cooler and a control valve are incorporated in the return side of the oil system.

The description and operation of these units is given in 72-01-00.

AIR-COOLED OIL COOLER - MAINTENANCE PRACTICES

1. Removal/Installation Air-Cooled Oil Cooler

Service Bulletins referred to:

S.B.73-3641 - Introduction of STA 103 Amplifier and Deletion of Speed Switch Mounting Bracket.
S.B.72-4280 - Introduction of High Frequency Filter Unit Mounting Bracket.

Referenced Procedures.

12-12-01	Engine Oil Replenishment
71-11-00	Cowlings, Engine No.1 and No.3 - Servicing
71-12-05	LH and RH Upper Hinges Cowl - Servicing

Illustrated Parts Catalogue References

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

70-02-01	Identification, Lubrications and Fitting of Sealing Rings
72-01-01	Oil System Tubes and Fittings
79-21-01	Air Cooled Oil Cooler Installation

R WARNING: THE SYNTHETIC LUBRICATING OIL USED IN THIS ENGINE
R MAY CAUSE IRRITATION, IF SKIN CONTACT IS REPEATED
R OR PROLONGED.

CAUTION: 1. THE OIL SPECIFIED FOR USE IN THIS OIL SYSTEM IS INJURIOUS TO PAINTWORK AND CERTAIN TYPES OF RUBBER AND MUST NOT BE ALLOWED TO CONTAMINATE THOSE PARTS OF THE ENGINE NOT NORMALLY IN CONTACT WITH IT. ANY OIL SPILT DURING SERVICING MUST BE WIPED UP IMMEDIATELY.

2. THE COMBINED WEIGHT OF THE AIR-COOLED OIL COOLER AND DIFFUSER DUCT IS APPROXIMATELY 26 LB. (12 KG.).

A. Remove Air-cooled Oil Cooler

(1) Equipment required:

Clean receptacle - minimum capacity

3 U.S. pints
3 Imperial pints
2 Litres

(2) Open left-hand hinged cowl 413A or 423A for engines No.1 and 3 (Ref. 71-11-00) or 433DL for engine No.2 (Ref. 71-12-05).

(3) Refer to fig.201, remove outlet duct (1).

(4) Disconnect connectors (2) and (3).

(5) Remove bolt, spacer and nut (4).

(6) Remove bolt and washer (5) and (6).

(7) Remove bolts and washers (7) and (8).

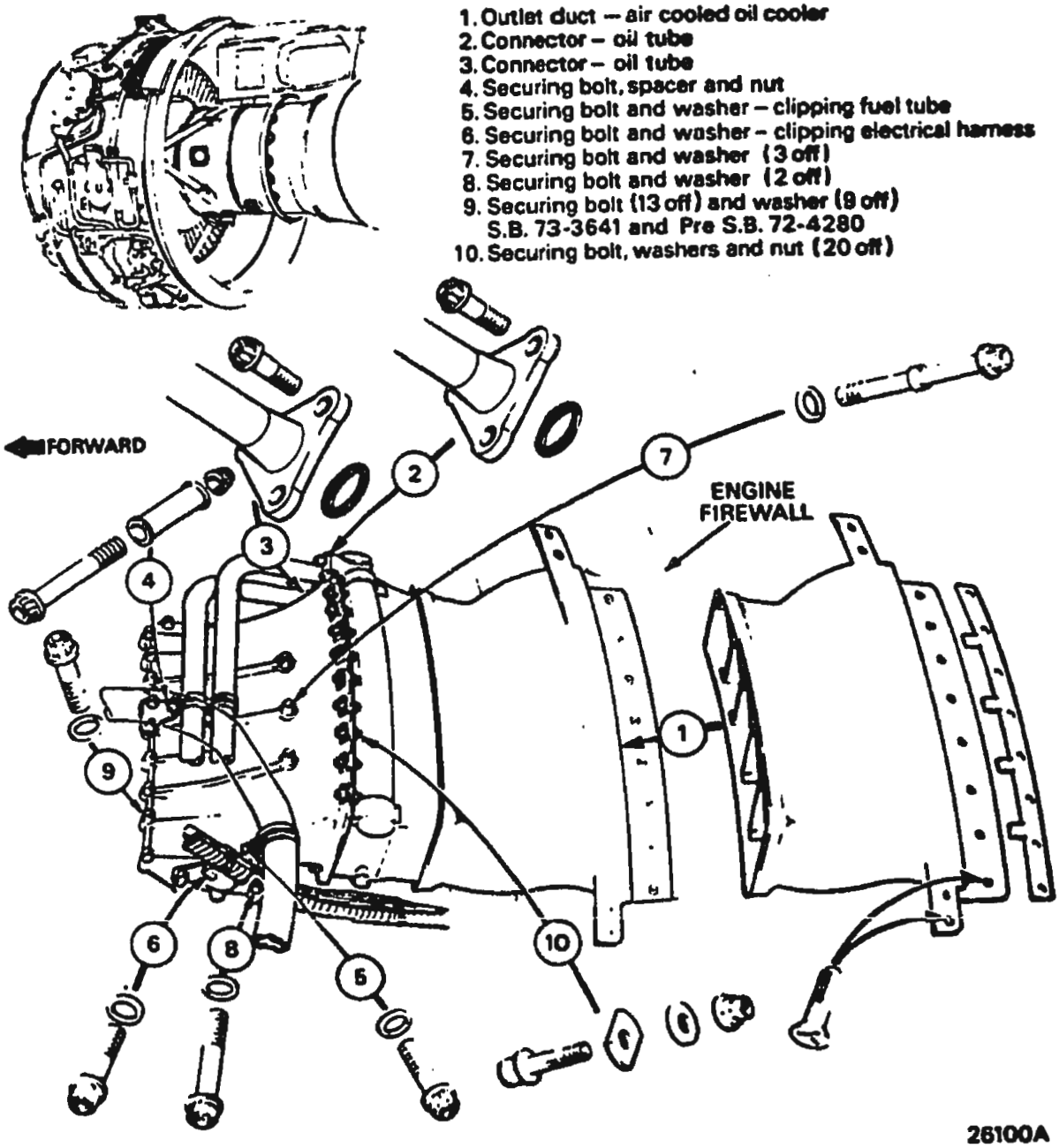
(8) On engines incorporating S.B.73-3641 and Pre S.B.72-4280, support oil cooler and diffuser duct and remove bolts and washers (9), noting positions of clip brackets (Ref. Fig.201, Sheet 1).

On engines incorporating S.B.72-4280 and Pre S.B.73-3641, support oil cooler and diffuser duct and remove bolts and washers (11) then bolts (12), noting position of clip brackets (Ref. fig.201, Sheet 2).

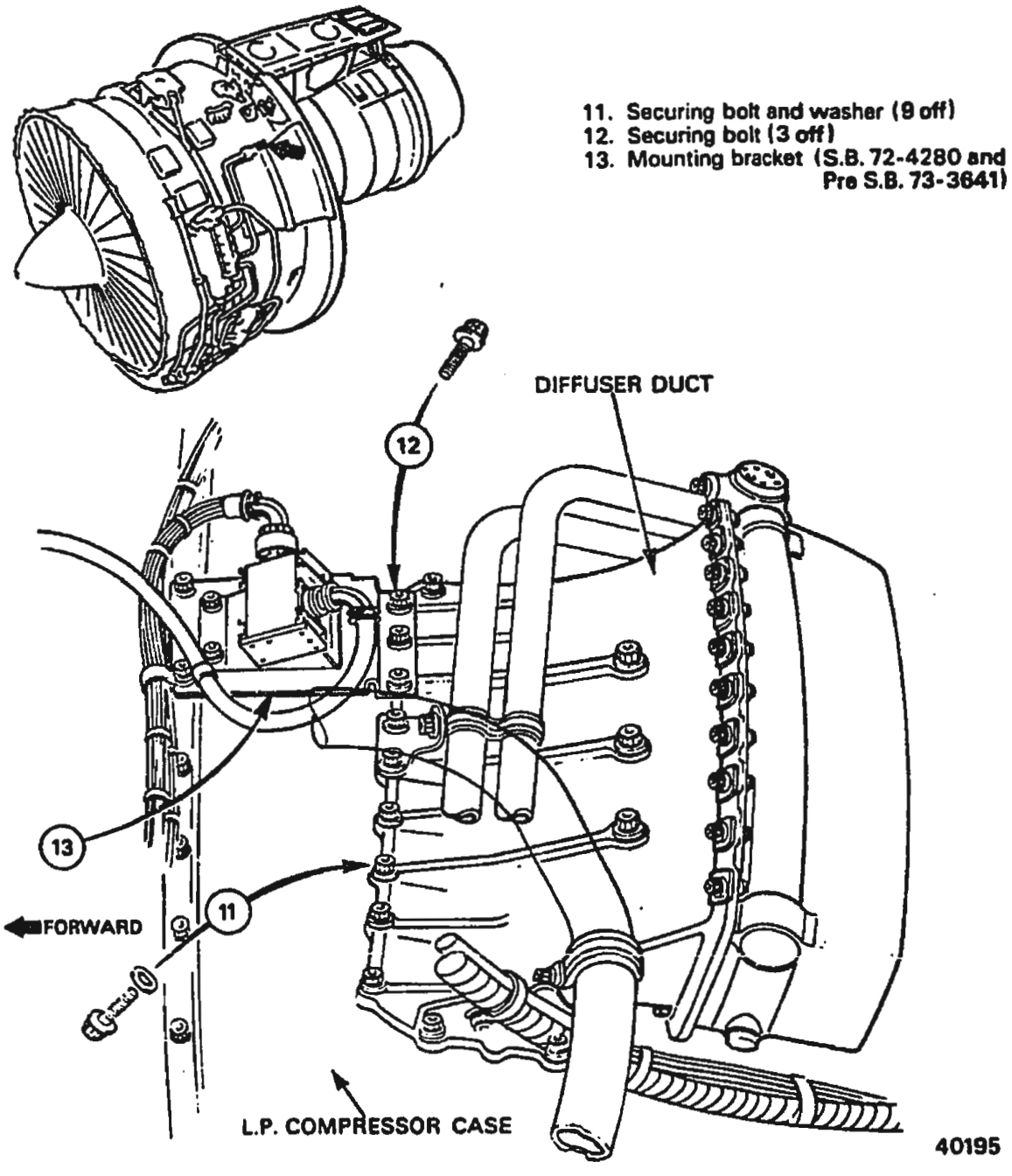
(9) Move cooler and duct towards rear of engine until clear of connectors (2) and (3) then remove from engine. Drain cooler contents into a clean receptacle then position cooler and duct on work surface.

(10) Remove bolts, washers and nuts (10) and separate oil cooler from diffuser duct.

(11) Fit approved blanks to all exposed apertures and connectors.


1. Outlet duct – air cooled oil cooler
2. Connector – oil tube
3. Connector – oil tube
4. Securing bolt, spacer and nut
5. Securing bolt and washer – clipping fuel tube
6. Securing bolt and washer – clipping electrical harness
7. Securing bolt and washer (3 off)
8. Securing bolt and washer (2 off)
9. Securing bolt (13 off) and washer (9 off)
S.B. 73-3641 and Pre S.B. 72-4280
10. Securing bolt, washers and nut (20 off)
FORWARD
ENGINE FIREWALL
26100A

R Air-cooled oil cooler disconnect points
R Fig.201 (Sheet 1)



R Air cooled oil cooler disconnect points
R Fig.201 (Sheet 2)

B. Install Air-Cooled Oil Cooler

(1) Equipment required:

Clean, stiff-bristled brush

(2) Material required:

Jointing compound: British spec. DTD.900/4586 (Hylomar light)

Degreasing fluid: British spec. B.S.4487:1969 (Chlorothene NU (Inhibisol (Genklene

(3) Remove blanks, if fitted, from all apertures and connectors.

(4) WARNING: WHEN USING DEGREASING FLUID, AVOID SKIN CONTACT AND INHALING THE VAPOUR.
Using degreasing fluid, remove all traces of old jointing compound from diffuser duct mating faces, also clean oil cooler mating face. Remove old jointing compound from L.P. compressor case.

(5) CAUTION: ENSURE JOINTING COMPOUND DOES NOT ENTER OIL OR AIR PASSAGES.
Brush apply thin film of jointing compound to diffuser duct and oil cooler mating faces; allow compound to dry for a minimum period of 10 minutes.

(6) Refer to fig.201, on work surface position oil cooler on diffuser duct so that holes in cooler mating face are in centre of slots in diffuser duct mating face. Fit and secure bolts, washers and nuts (10).

(7) CAUTION: ENSURE JOINTING COMPOUND DOES NOT ENTER AIR PASSAGES.
Brush apply thin film of jointing compound to mating faces of diffuser duct and L.P. compressor case; allow compound to dry for a minimum period of 10 minutes.

(8) Fit and lubricate (Ref. 70-02-01) new seal ring to connectors (2) and (3).

(9) On engines incorporating S.B.73-3641 and Pre S.B.72-4280, position oil cooler and diffuser duct on L.P. compressor case and ensure positive dowel location and correct fitting of connectors (2) and (3) in oil cooler. Align bolt holes in diffuser duct and L.P. compressor case, and correctly position clipping brackets as noted in operation A.(8). Fit and secure bolts and washers (9), (8) and (7).

(10) On engines incorporating S.B.72-4280 and Pre S.B.73-3641, position diffuser duct and oil cooler under bracket (13) and locate on L.P. compressor case ensuring positive dowel location and correct fitting of connectors (2) and (3) in oil cooler. Align bolt holes in diffuser duct and compressor case, and position clipping brackets as noted in operation A.(8), then fit and secure bolts and washers (11), (8) and (7) and bolts (12).

(11) Fit and secure bolt and washer (6) and (5).

(12) Fit and secure bolt, spacer and nut (4).

(13) Secure connectors (3) and (2).

(14) Fit and secure outlet duct (1).

(15) Replenish oil system as required (Ref. 12-12-01).

NOTE: Replacement of air-cooled oil cooler incurs a loss of 3 pints (approximately) of oil from engine oil system.

(16) Close left-hand hinged cowl 413A or 423A for engines No.1 and 3 (Ref. 71-11-00) or 433DL for engine No.2 (Ref. 71-12-05).

2. Removal/Installation Air-Cooled Oil Cooler Pressure Relief Valve

Referenced Procedures.

70-02-01	Identification, Lubricating and Fitting of Rubber Seal Rings
71-11-00	Cowlings, Engine No.1 and No.3 - Servicing
71-12-05	LH and RH Upper Hinged Cowl - Servicing

Illustrated Parts Catalogue References

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

79-21-01 Air Cooled Oil Cooler

A. Remove Pressure Relief Valve

R WARNING: THE SYNTHETIC LUBRICATING OIL USED IN THIS
R ENGINE MAY CAUSE IRRITATION, IF SKIN CONTACT IS
R REPEATED OR PROLONGED.

CAUTION: THE OIL SPECIFIED FOR USE IN THIS OIL SYSTEM IS INJURIOUS TO PAINTWORK AND CERTAIN TYPES OF RUBBER AND MUST NOT BE ALLOWED TO CONTAMINATE THOSE PARTS OF THE ENGINE NOT NORMALLY IN CONTACT WITH IT. ANY OIL SPILT DURING SERVICING MUST BE WIPED UP IMMEDIATELY.

(1) Equipment required:

E.R.E.1626 Spanner

(2) Open left-hand hinged cowl, 413A or 423A for engines No.1 and No.3 (Ref.71-11-00) or 433DL for engine No.2 (Ref.71-12-05).

(3) CAUTION: ITEMS (1), (3) AND (4), ARE UNDER SPRING TENSION THEREFORE EXTREME CARE MUST BE EXERCISED WHEN RELEASING VALVE ASSEMBLY.
Refer to fig.201, using tool E.R.E.1626, carefully remove valve cover (1).

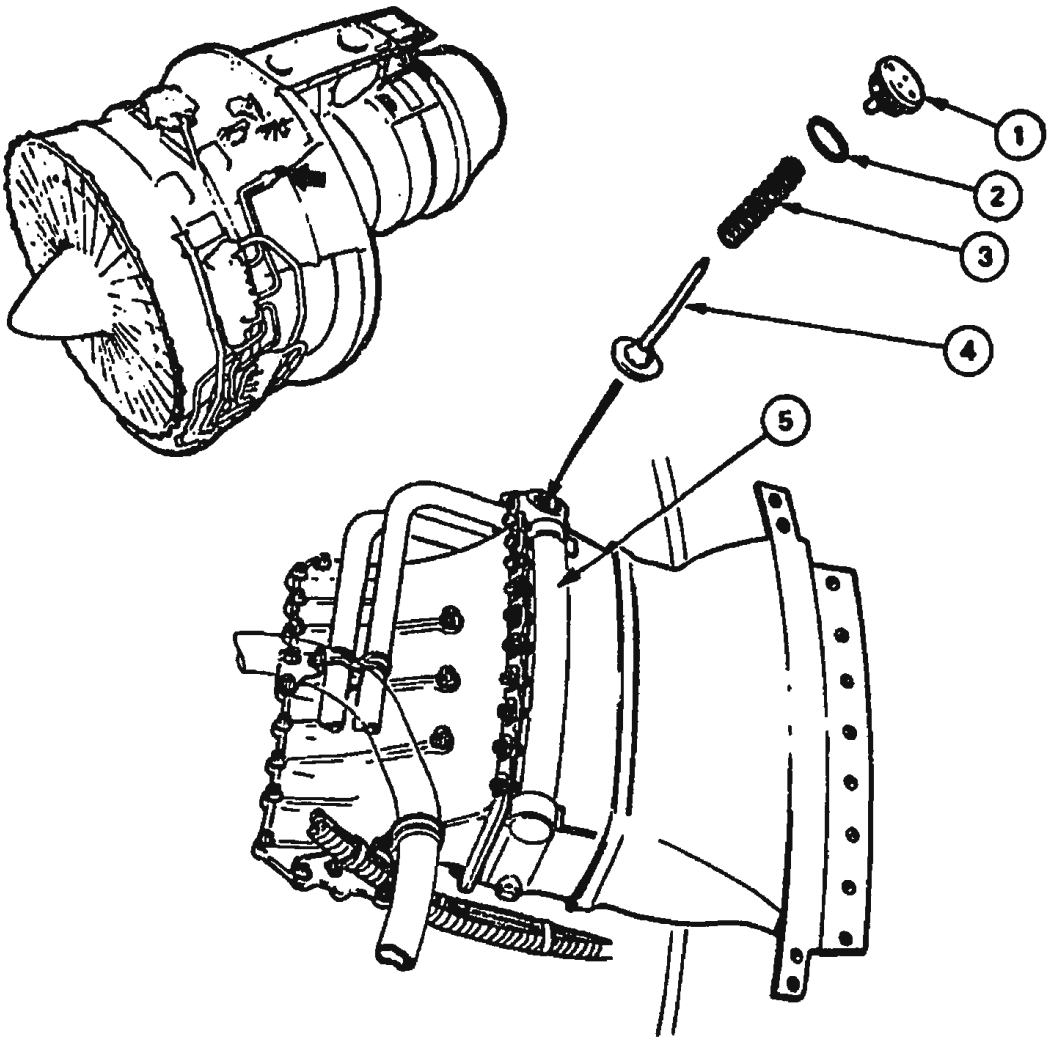
(4) Remove spring (3) and valve (4).

(5) Fit approved blank to valve aperture.

B. Install Pressure Relief Valve

(1) Equipment required:

E.R.E.1626 Spanner



1 Valve cover
2 Seal ring
3 Spring
4 Valve
5 Air cooled oil cooler

30974

Air Cooled Oil Cooler Pressure Relief Valve - Removal/Installation
Fig.202

(2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Lockwire	DTD.189A 22 S.W.G.	21 A.W.G.	238

(3) Check all parts are clean. If necessary wash parts in clean kerosine using a nylon brush to remove stubborn deposits and dry with a clean lint free cloth.

(4) Remove blank from valve aperture.

(5) Refer to fig.201, position valve (4) on valve seat.

(6) Place spring (3) over valve stem.

(7) Fit and lubricate (Ref.70-02-01) new seal ring (2) to valve housing.

(8) Fit valve cover (1) to cooler (5), ensuring that valve stem is correctly positioned in valve guide.

(9) Using tool E.R.E.1626, tighten valve cover and wirelock.

(10) Close left-hand hinged cowl, 413A or 423A for engines No.1 and No.3 (Ref.71-11-00) or 433DL for engine No.2 (Ref.71-12-05).

3. Inspection/Check Air-Cooled Oil Cooled Pressure Relief Valve

A. Check Pressure Relief Valve.

(1) Check valve seat face for damage.

(2) Check valve face and spring for damage.

(3) Check valve slides freely in its guide. If necessary, lightly stone valve stem to remove high spots.

FUEL COOLED OIL COOLER - MAINTENANCE PRACTICES

1. Removal/Installation Fuel Cooled Oil Cooler

Service Bulletin referred to:

S.B.71-2577 Engine light duty electrical harness - Additional clipping.
S.B.73-3669 L.P. fuel tube connectors with reduced end float.
S.B.73-5220 L.P. Fuel connectors with hard coating deleted

Referenced Procedures:

12-12-01 Engine Oil Replenishing
70-02-01 Identification Lubrication and Fitting of Rubber Sealing Rings
71-11-00 Cowlings, Engines No.1 and No.3 - Servicing
71-12-01 LH and RH Lower Hinged Cowl - Servicing
73-00-00 Engine Fuel and Control - Servicing
73-00-00 Engine Fuel and Control - Adjustment/Test
73-11-09 Fuel Tubes - Maintenance Practices

Illustrated Parts Catalogue References

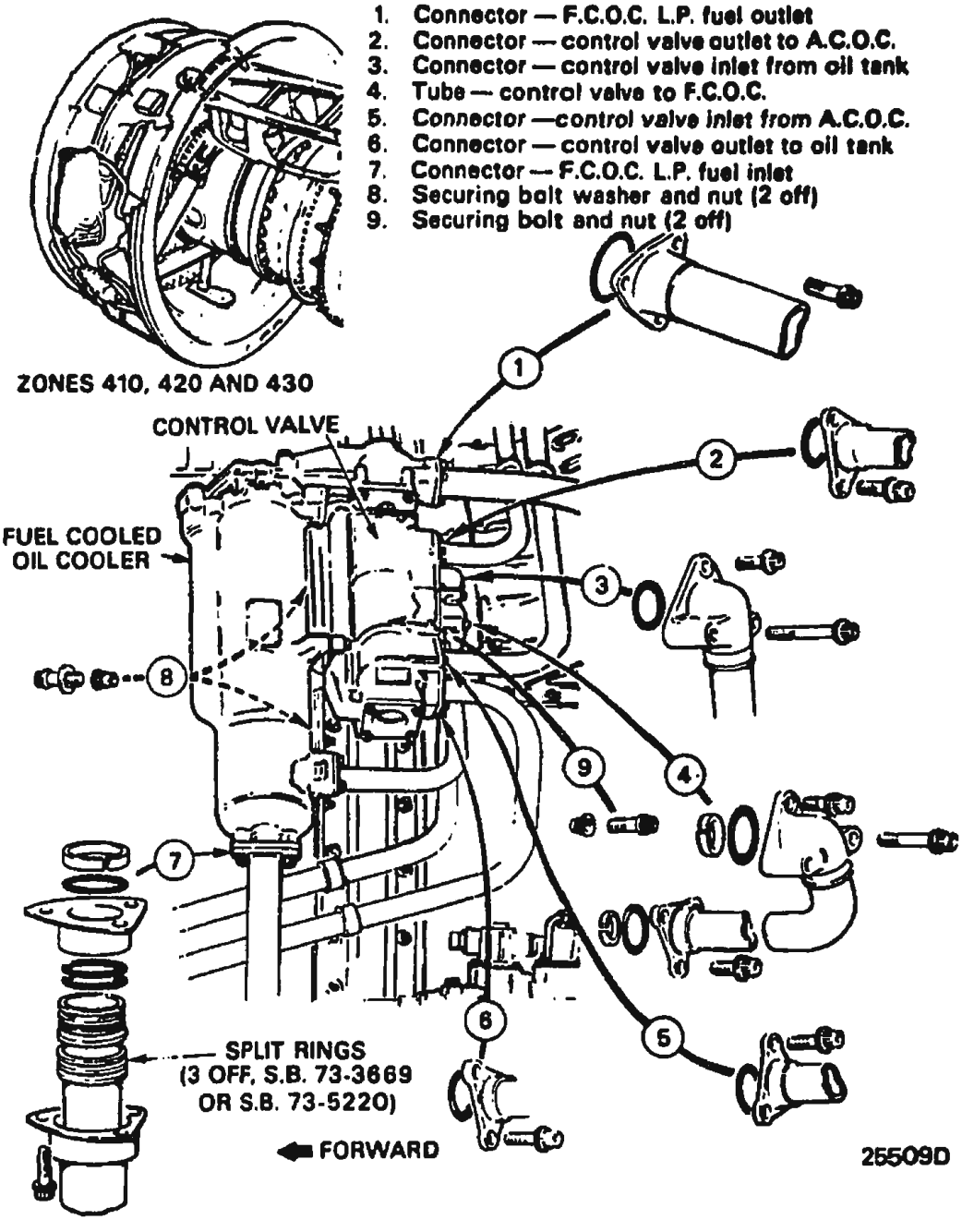
The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

72-01-01 Oil System Tubes and Fittings
73-11-09 Fuel System Tubes
79-21-02 Fuel Cooled Oil Cooler Installation
79-21-03 Distribution Control Valve Installation

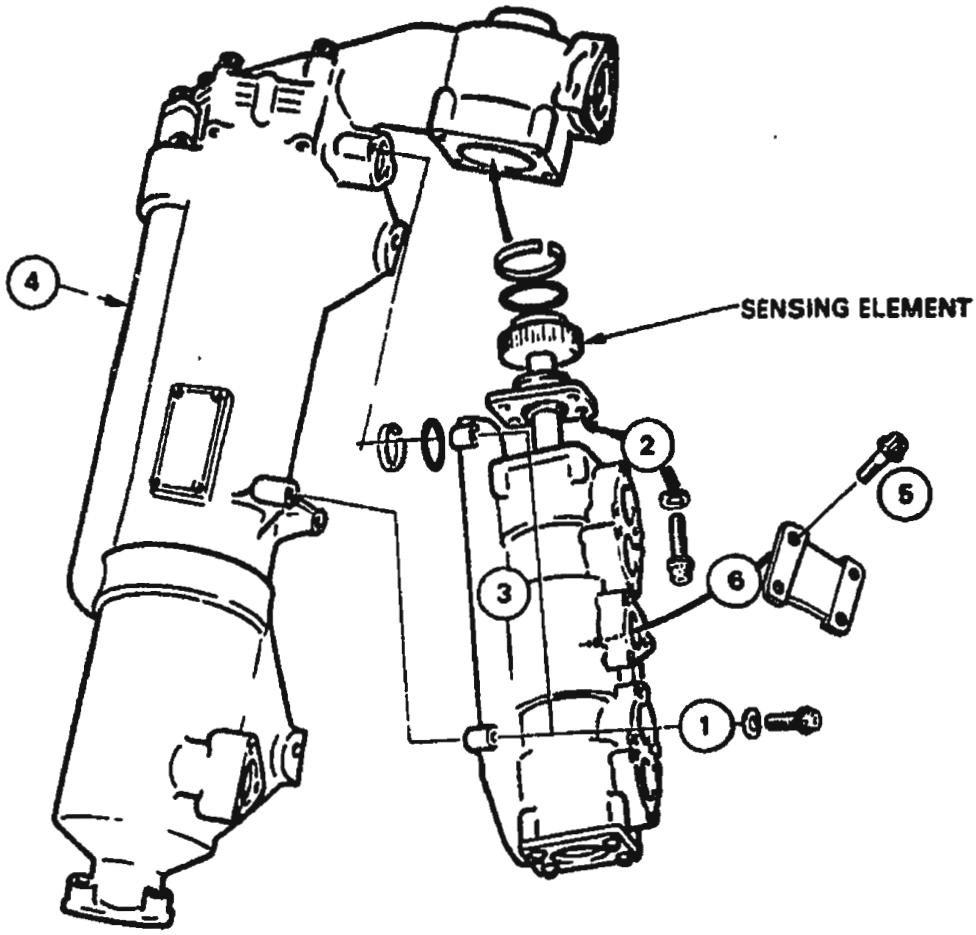
R WARNING: THE SYNTHETIC LUBRICATING OIL USED IN THIS ENGINE
R MAY CAUSE IRRITATION, IF SKIN CONTACT IS REPEATED
R OR PROLONGED.

CAUTION: 1. THE OIL SPECIFIED FOR USE IN THIS OIL SYSTEM IS INJURIOUS TO PAINTWORK AND CERTAIN TYPES OF RUBBER AND MUST NOT BE ALLOWED TO CONTAMINATE THOSE PARTS OF THE ENGINE NOT NORMALLY IN CONTACT WITH IT. ANY OIL SPILT DURING SERVICING MUST BE WIPED UP IMMEDIATELY.

2. THE COMBINED WEIGHT OF THE F.C.O.C. AND CONTROL VALVE IS APPROXIMATELY 26 LB (12 KG).


1. Connector — F.C.O.C. L.P. fuel outlet
2. Connector — control valve outlet to A.C.O.C.
3. Connector — control valve inlet from oil tank
4. Tube — control valve to F.C.O.C.
5. Connector — control valve inlet from A.C.O.C.
6. Connector — control valve outlet to oil tank
7. Connector — F.C.O.C. L.P. fuel inlet
8. Securing bolt washer and nut (2 off)
9. Securing bolt and nut (2 off)
ZONES 410, 420 AND 430
CONTROL VALVE
FUEL COOLED OIL COOLER
SPLIT RINGS (3 OFF, S.B. 73-3669 OR S.B. 73-5220)
FORWARD
25509D

R Fuel cooled oil cooler and control valve disconnect points
R Fig.201



1. Securing bolt and washer (4 off)
2. Securing bolt and washer (4 off)
3. Control valve
4. Fuel cooled oil cooler
5. Securing bolt (2 off)
6. Support bracket

25510B

Fuel cooled oil cooler and control valve removal/installation
Fig.202

A. Remove Fuel Cooled Oil Cooler and Control Valve Assembly

(1) Equipment required:

Clean receptacle - minimum capacity

5 U.S. gallons
4 Imperial gallons
18 Litres

Flexible hose - approximate length 72in. (1800 mm)
internal diameter 0.5in. (12 mm)

(2) On pilots overhead control panel, zone 210, pull appropriate Fire Emergency Shut-off Control.

(3) Open left-hand hinged cowl, 413A or 423A for engines No.1 and 3 (Ref. 71-11-00) or 433AL for engine No.2 (Ref. 71-12-01).

(4) Drain engine L.P. fuel system (Ref. 73-00-00, Servicing).

(5) Refer to fig.201, disconnect connectors (1), (2) and (3).

(6) Remove tube (4).

(7) Disconnect connectors (5), (6) and (7).

(8) Remove bolts, nuts and washers (8).

(9) Support assembly and remove bolts and nuts (9).

(10) Remove assembly and position on work surface.

(11) Refer to fig.202, remove bolts and washers (1) and (2) and withdraw control valve (3) from F.C.O.C. (4) taking care not to damage sensing element.

(12) Fit approved blanks to all exposed apertures.

If control valve is being replaced

(13) Remove bolts (5) and support bracket (6) and retain for fitment to new control valve.

B. Install Fuel Cooled Oil Cooler

Refer to 73-11-09 for correct procedure for fitting fuel tubes.

(1) Ensure appropriate systems are deactivated as detailed in operation A.(2).

(2) With items on work surface remove blanks, if fitted, from all apertures.

Operation (3) applies only when fitting a new control valve

(3) Refer to fig. 202, position support bracket (6) on control valve (3) and secure with bolts (5).

(4) Fit and lubricate (Ref. 70-02-01) new seal rings to control valve.

(5) Enter projecting sensing element on control valve (3) into aperture in F.C.O.C. (4).

(6) Secure control valve to F.C.O.C. with bolts and washers (2) and (1).

(7) Refer to fig.201, position assembly on engine and secure with bolts and nuts (9) and bolts, washers and nuts (8)

(8) Fit and lubricate (Ref. 70-02-01) new seal rings to all disturbed tube ends and connectors.

(9) Connect and secure connectors (7), (6) and (5).

On engines incorporating S.B.71-2577 position harness bracket under two of the bolts securing connector (7).

(10) Fit and secure tube (4).

(11) Connect and secure connectors (3), (2) and (1).

(12) Reactivate systems deactivated in operation A.(2).

(13) Prime engine L.P. fuel system (Ref. 73-00-00, Servicing) and test for leaks at disturbed fuel connectors (Ref. 73-00-00, Adjustment/Test).

(14) Check relevant oil tank contents (Ref. 12-12-01).

(15) Close left-hand hinged cowl, 413A or 423A for engines No.1 and 3 (Ref. 71-11-00) or 433AL for engine No.2 (Ref. 71-12-01).

2. Removal/Installation Fuel Cooled Oil Cooler Pressure Relief Valve

Referenced Procedures:

70-02-01 Identification, Lubrication and Fitting of Rubber Seal Rings
71-11-00 Cowlings, Engines No.1 and No.3 - Servicing
71-12-01 LH and RH Lower Hinged Cowl - Servicing

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

79-21-02 Fuel Cooled Oil Cooler

A. Remove Pressure Relief Valve

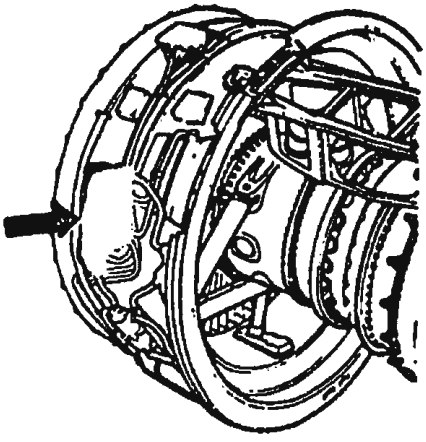
R WARNING: THE SYNTHETIC LUBRICATING OIL USED IN THIS ENGINE
R MAY CAUSE IRRITATION, IF SKIN CONTACT IS REPEATED
R OR PROLONGED.

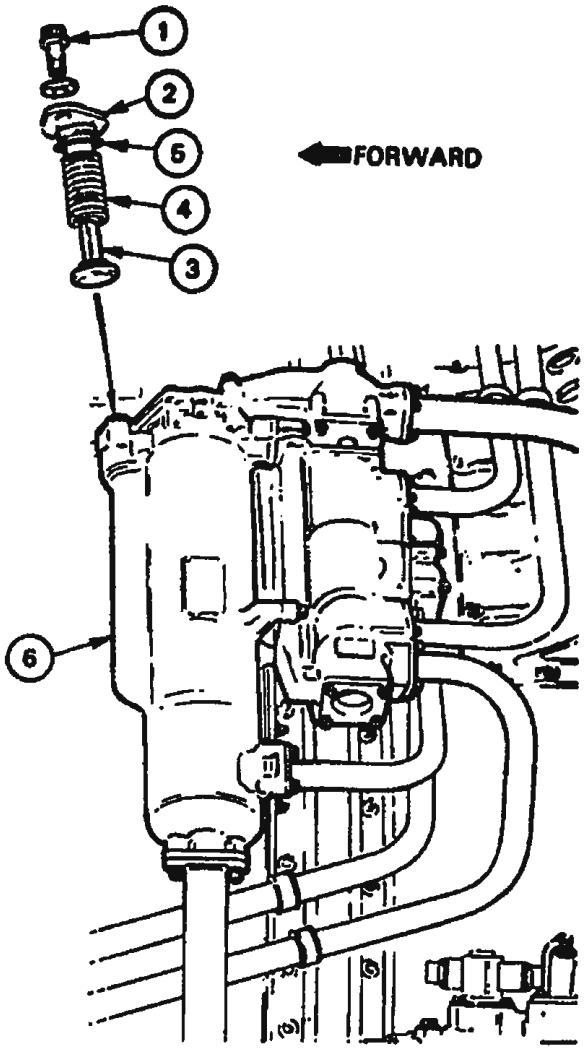
CAUTION: THE OIL SPECIFIED FOR USE IN THIS OIL SYSTEM IS INJURIOUS TO PAINTWORK AND CERTAIN TYPES OF RUBBER AND MUST NOT BE ALLOWED TO CONTAMINATE THOSE PARTS OF THE ENGINE NOT NORMALLY IN CONTACT WITH IT. ANY OIL SPILT DURING SERVICING MUST BE WIPED UP IMMEDIATELY.

(1) Open left-hand hinged cowl, 413A or 423A for engines No.1 and 3 (Ref. 71-11-00) or 433AL for engine No.2 (Ref. 71-12-01).

(2) CAUTION: ITEMS (2) THROUGH (4) ARE UNDER SPRING TENSION THEREFORE EXTREME CARE MUST BE EXERCISED WHEN RELEASING VALVE ASSEMBLY.
Refer to fig.203, remove securing bolts and washers (1).

(3) Remove valve cover (2), valve (3) and spring (4).





1. Securing bolt and washer - 2 off
2. Valve cover
3. Valve
4. Spring
5. Seal ring
6. F.C.O.C.

Fuel Cooled Oil Cooler Pressure Relief Valve - Removal/Installation
Fig.203

(4) Fit approved blank to valve aperture.

B. Install Pressure Relief Valve

(1) Check that all parts are clean. If necessary wash parts in clean kerosine using a nylon brush to remove stubborn deposits and dry with a clean lint free cloth.

(2) Remove blank from valve aperture.

(3) Refer to fig.203, position valve (3) on valve seat.

(4) Place spring (4) over valve stem.

(5) Fit and lubricate (Ref. 70-02-01) new seal ring (5) to valve housing.

(6) Fit valve cover (2) to cooler (6), ensuring that valve stem is correctly located in valve guide.

(7) Secure valve cover to F.C.O.C. with bolts and washers (1).

(8) Close left-hand hinged cowl, 413A or 423A for engines No.1 and 3 (Ref. 71-11-00) or 433AL for engine No.2 (Ref. 71-12-01).

3. Inspection/Check Fuel Cooled Oil Cooler Pressure Relief Valve

A. Check Pressure Relief Valve

(1) Check valve seal face for damage.

(2) Check valve face and spring for damage.

(3) Check valve slides freely in its guide. If necessary, lightly stone valve stem to remove high-spots.

CONTROL VALVE - MAINTENANCE PRACTICES

1. Removal/Installation Control Valve

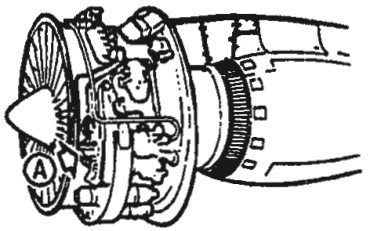
79-21-02 details the removal/installation of the fuel cooled oil cooler and the control valve as an assembly and also the work bench removal/installation of the control valve from the fuel cooled oil cooler.

INDICATING - DESCRIPTION AND OPERATION

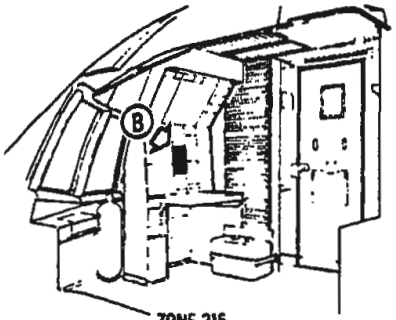
1. General

The status of engine oil pressure, oil temperature, and oil quantity is provided to the Flight Engineer/Second Officer on direct-reading indicators (Ref. Fig. 1). Two independent engine oil pressure warning lights are located on the pilots center instrument panel, zone 210.

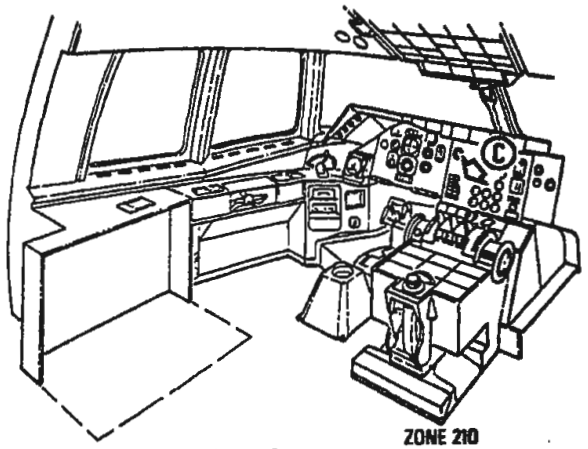
The oil pressure indicating and warning system for each engine provides the Flight Engineer/Second Officer with a specific indication of oil pressure on a round-dial indicator, and a warning of excessive pressure drop across the oil filter by means of an amber warning light. The system also provides warnings of low oil pressure and excessive pressure drop across the oil filter to the pilots by means of indicator lights on the pilots center instrument panel. Engine oil temperature is sensed downstream from each oil filter and displayed on indicators located on the Flight Engineer/Second Officers ENGINE OIL panel. Oil quantity indicators are located immediately above the temperature indicators, and the applicable transmitter for each is located on the engine gearbox next to the dipstick installation.



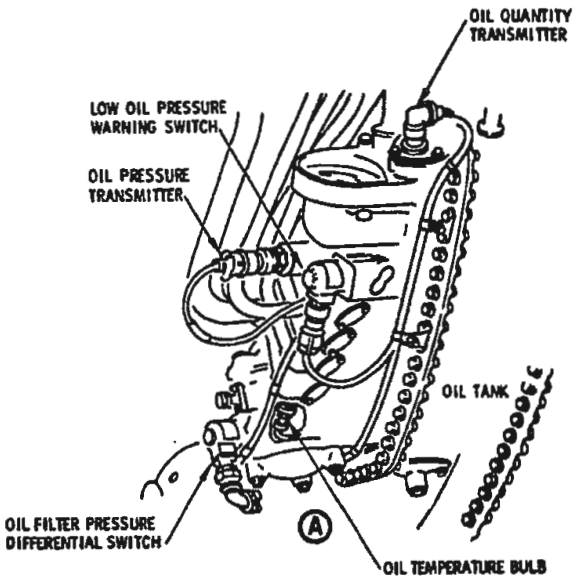
ZONES 410, 420 AND 430

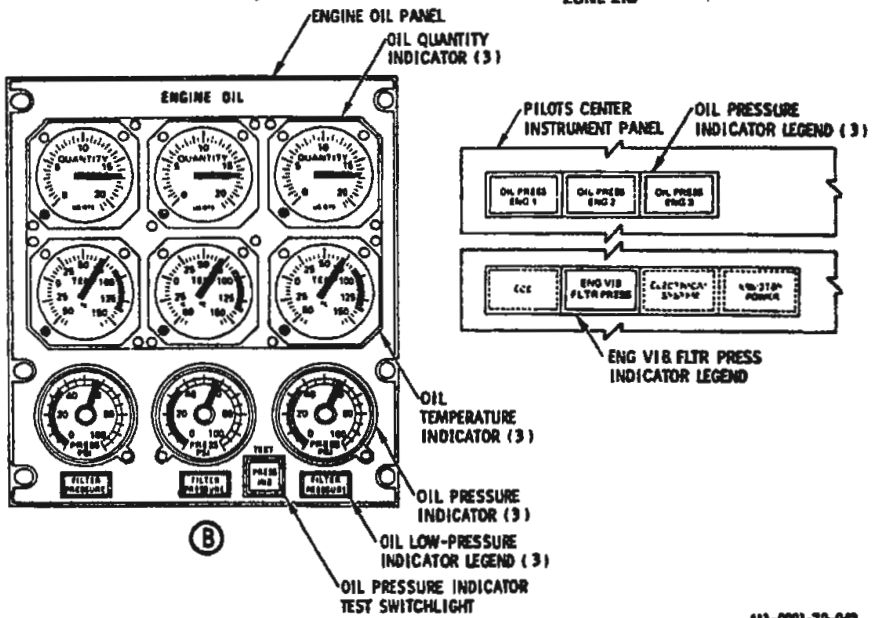


ZONE 215



ZONE 210





M1-0001-79-042

R Engine Oil Indicating System Components
R Figure 1

OIL SYSTEM INDICATING - FAULT ISOLATION

1. General

The fault isolation diagrams in this section can be used for fault isolation any time a fault is reported or suspected. Before fault isolation is started, the PREREQUISITES listed on the diagram must be fulfilled.

If the flight crew reports a trouble using a FIRM Fault Code number, the number can be found in the FIRM Fault Code Cross Reference Table in the Chapter 79-INDEX.

The FIRM Fault Code Cross Reference Table includes the flight report (fault symptoms) and the exact Section, Figure, Sheet, and Block number where fault isolation should begin. (Refer to the L-1011 Maintenance Manual Introduction for a more detailed explanation on the use of fault isolation diagrams.)

If a fault is reported or suspected and no FIRM Fault Code is available, the function or fault indication can be found in the table below. When a diagram is selected in this manner fault isolaltion is started at Block 1.

2. Fault Isolation/Identification

Table 101 is a list of all fault isolation data in this section of the manual.

Fault Isolation Data
Table 101

	FIGURE	TITLE
	101	Component Locator Index
	102	Oil System Indication Component Locator
	103	Oil Pressure Indication Fault Isolation
	104	Oil Temperature Indication Fluctuates
	105	Oil Quantity Indication Fluctuates
R R	SCHEM 1	Engine No. 1 Oil Pressure Indicating and Warning System Schematic

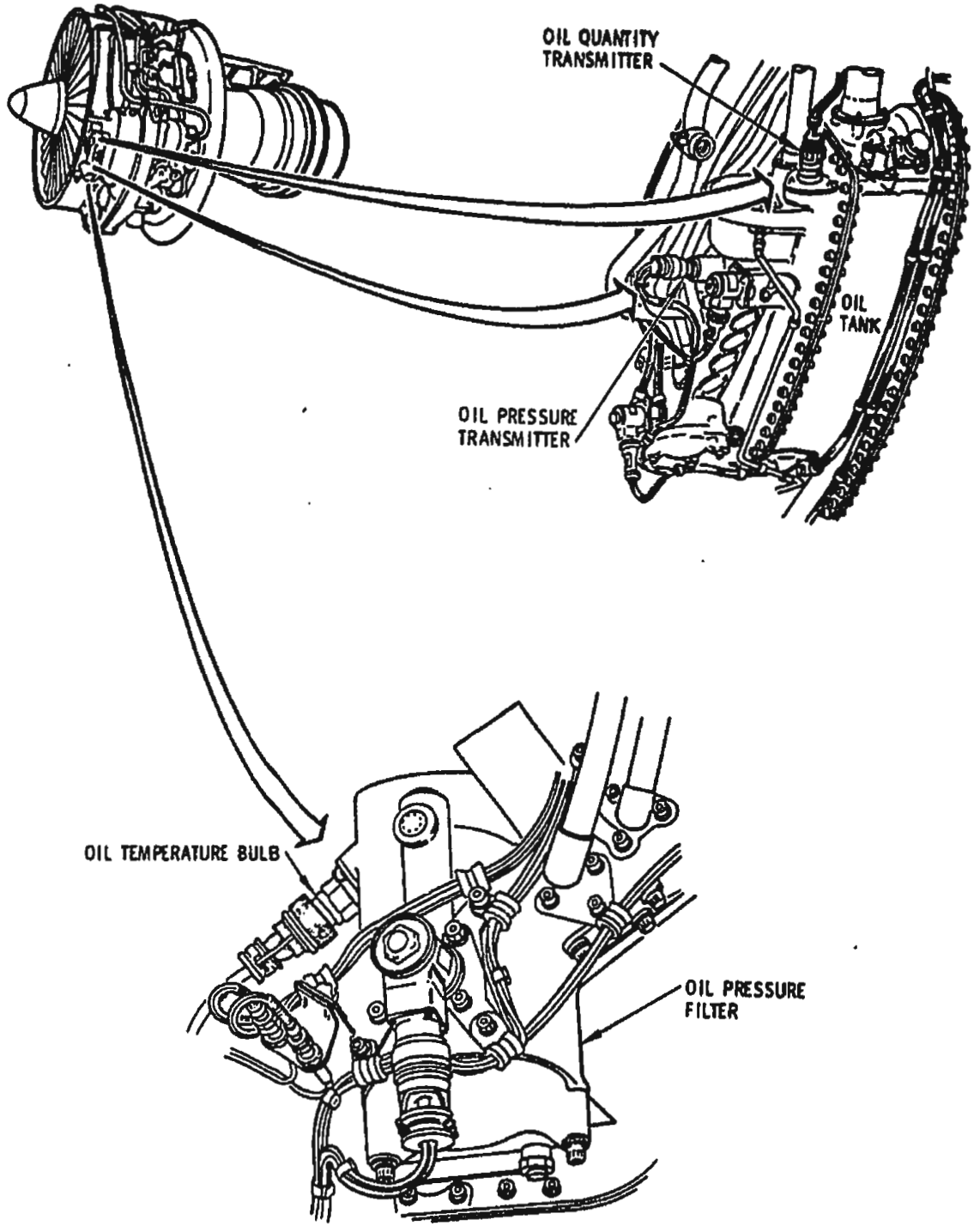
R Fault Isolation Data (Cont)
R Table 101

FIGURE	TITLE
SCHEM 2	Engine No. 2 Oil Pressure Indicating and Warning System Schematic
SCHEM 3	Engine No. 3 Oil Pressure Indicating and Warning System Schematic
SCHEM 4	Oil Quantity Indicating System Schematic
SCHEM 5	Oil Temperature Indicating System Schematic

COMPONENT	QTY	AREA/ACCESS	REFERENCE
OIL PRESSURE INDICATOR	3	FLT STATION/ENGIN OIL PANEL	79-31-04
OIL PRESSURE TRANSMITTER			
WING ENGINES	2	ACCESSORY SECTION/LH HINGED COWL	
NO. 2 ENGINE	1	ACCESSORY SECTION/LOWER LH HINGED COWL	79-31-01
OIL TEMPERATURE BULB			
WING ENGINES	2	ACCESSORY SECTION/LH HINGED COWL	
NO. 2 ENGINE	1	ACCESSORY SECTION/LOWER LH HINGED COWL	79-34-01
OIL TEMPERATURE INDICATOR	3	FLT STATION/ENGINE OIL PANEL	79-34-02
OIL QUANTITY INDICATOR	3	FLT STATION/ENGINE OIL PANEL	79-37-02
OIL TEMPERATURE TRANSMITTER			
WING ENGINES	2	ACCESSORY SECTION/LH HINGED COWL	
NO. 2 ENGINE	1	ACCESSORY SECTION/LOWER LH HINGED COWL	79-37-01

M1-0000-79-028

Component Locator Index
Figure 101

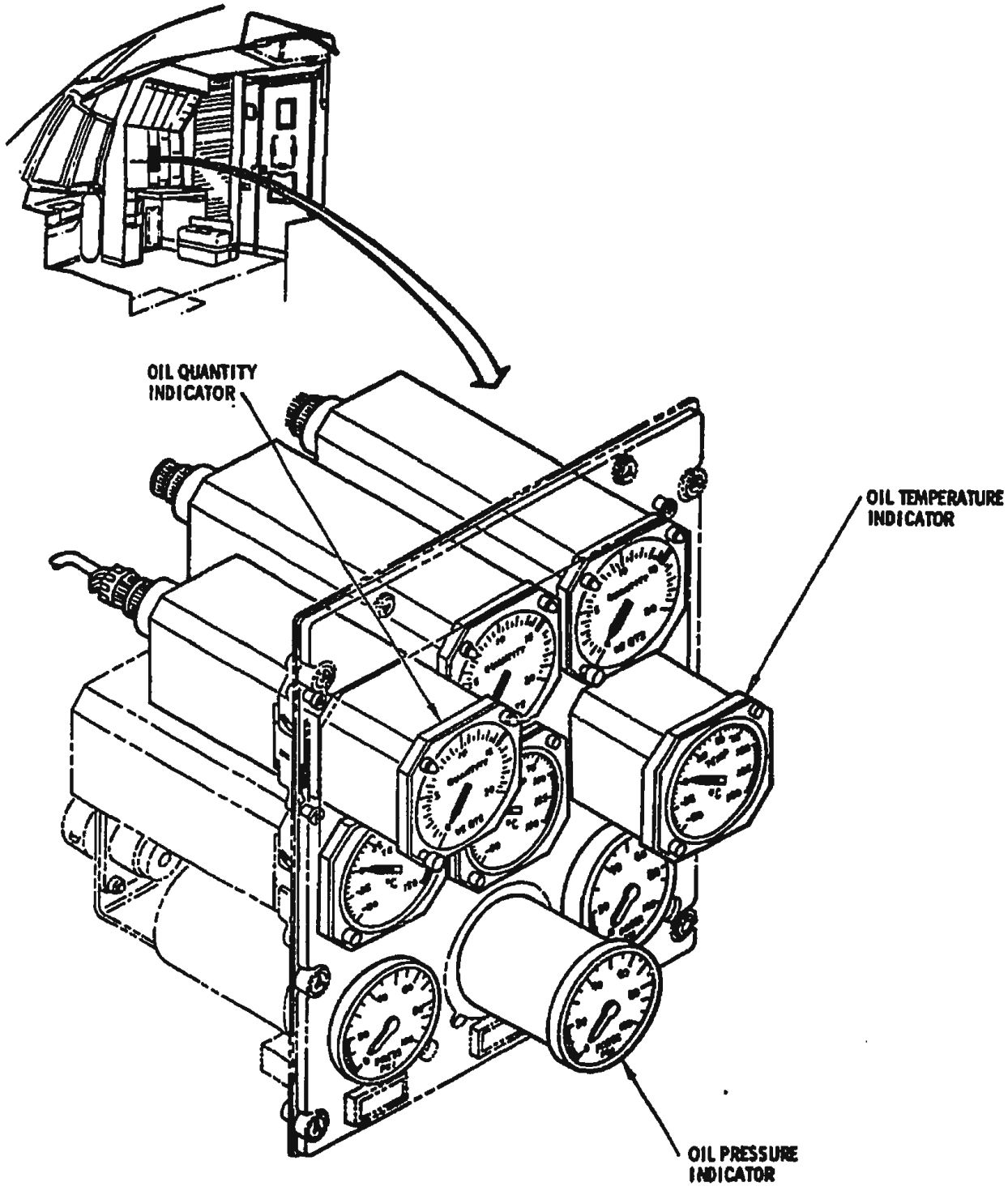


M1-0002-79-021

R Oil System Indication Components Locator
R Figure 102 (Sheet 1)

EFFECTIVITY: ALL

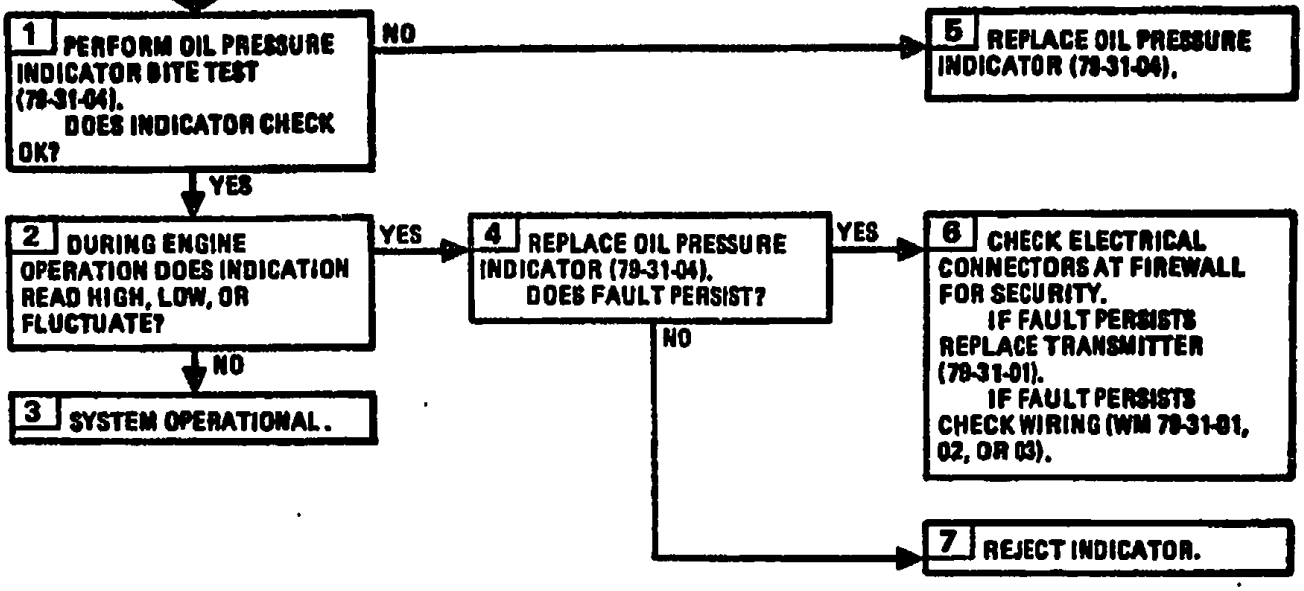
001B



Oil System Indication Components Locator
Figure 102 (Sheet 2)

OIL PRESSURE INDICATION FAULT ISOLATION

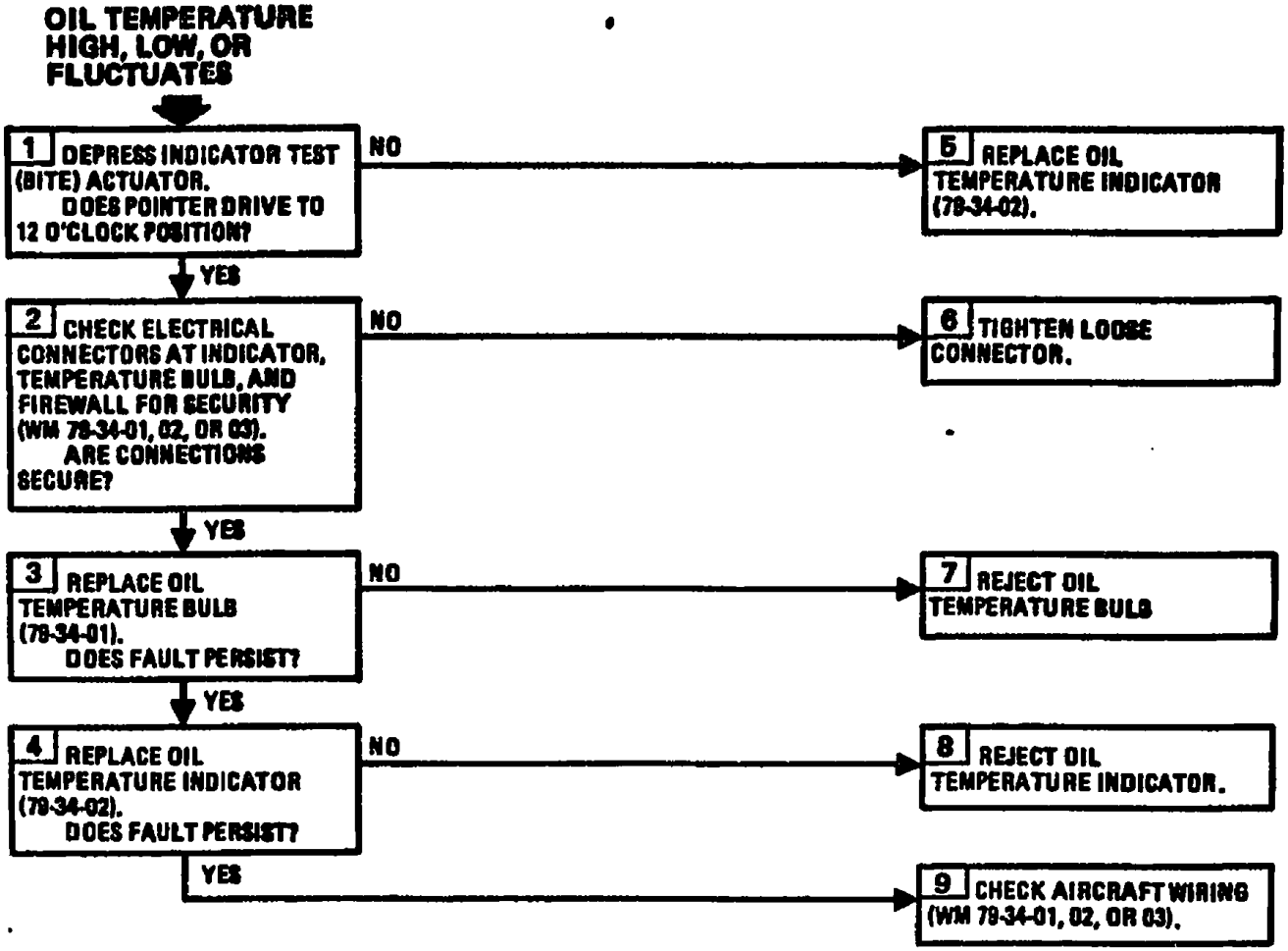
PREREQUISITES
ELECTRICAL PWR (24-41-00)
CB: CB3-R10


1 PERFORM OIL PRESSURE INDICATOR BITE TEST (79-31-04). DOES INDICATOR CHECK OK?
NO
5 REPLACE OIL PRESSURE INDICATOR (79-31-04).
YES
2 DURING ENGINE OPERATION DOES INDICATION READ HIGH, LOW, OR FLUCTUATE?
YES
4 REPLACE OIL PRESSURE INDICATOR (79-31-04). DOES FAULT PERSIST?
YES
6 CHECK ELECTRICAL CONNECTORS AT FIREWALL FOR SECURITY. IF FAULT PERSISTS REPLACE TRANSMITTER (79-31-01). IF FAULT PERSISTS CHECK WIRING (WM 79-31-01, 02, OR 03).
NO
NO
3 SYSTEM OPERATIONAL.
7 REJECT INDICATOR.

M1-0001-79-018

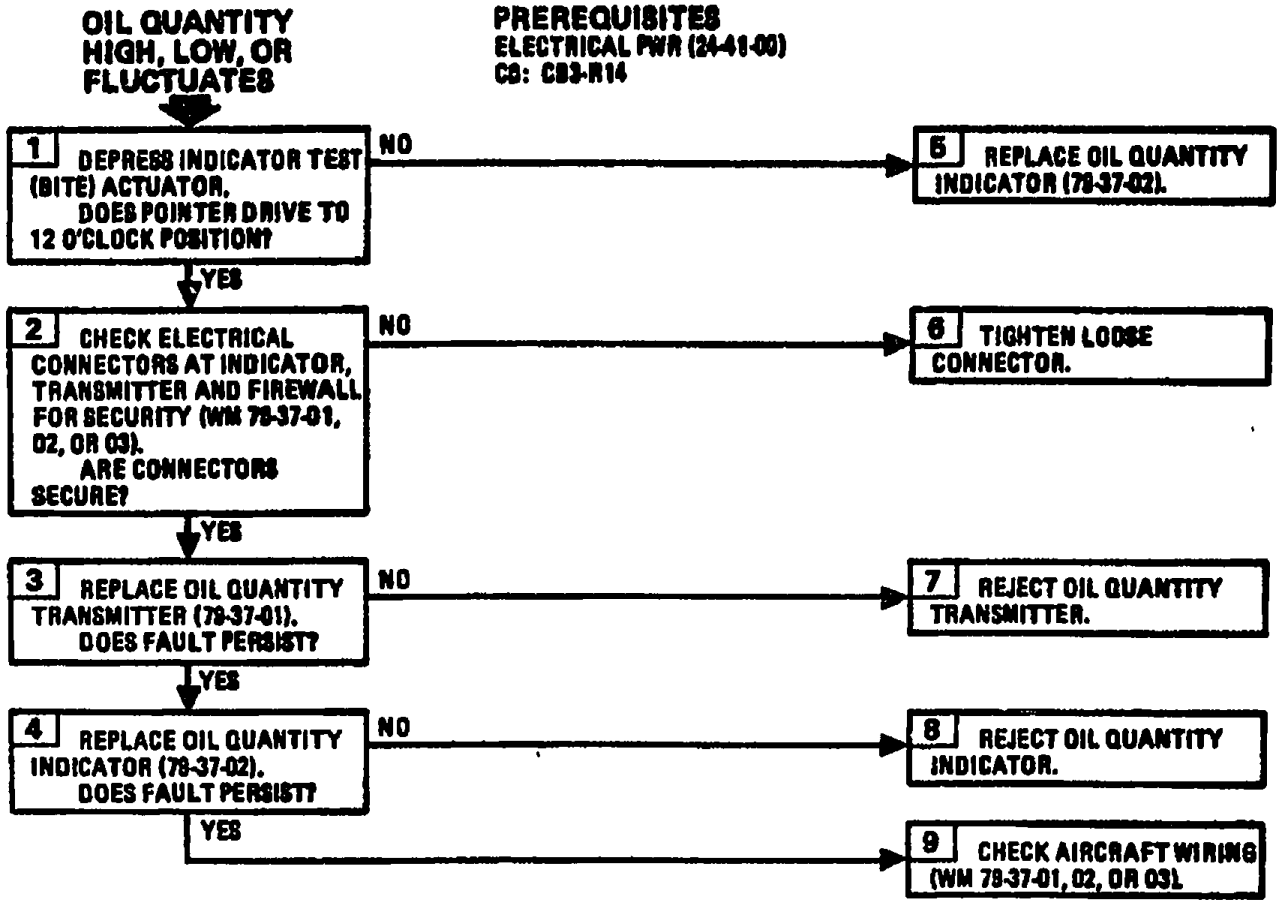
Oil Pressure Indication Fault Isolation
Figure 103

PREREQUISITES
ELECTRICAL PWR (24-41-00)
CB'S: CB3-P1, P7, OR P12


OIL TEMPERATURE HIGH, LOW, OR FLUCTUATES
1 DEPRESS INDICATOR TEST (BITE) ACTUATOR. DOES POINTER DRIVE TO 12 O'CLOCK POSITION?
NO
5 REPLACE OIL TEMPERATURE INDICATOR (79-34-02).
YES
2 CHECK ELECTRICAL CONNECTORS AT INDICATOR, TEMPERATURE BULB, AND FIREWALL FOR SECURITY (WM 79-34-01, 02, OR 03). ARE CONNECTIONS SECURE?
NO
6 TIGHTEN LOOSE CONNECTOR.
YES
3 REPLACE OIL TEMPERATURE BULB (79-34-01). DOES FAULT PERSIST?
NO
7 REJECT OIL TEMPERATURE BULB
YES
4 REPLACE OIL TEMPERATURE INDICATOR (79-34-02). DOES FAULT PERSIST?
NO
8 REJECT OIL TEMPERATURE INDICATOR.
YES
9 CHECK AIRCRAFT WIRING (WM 79-34-01, 02, OR 03).

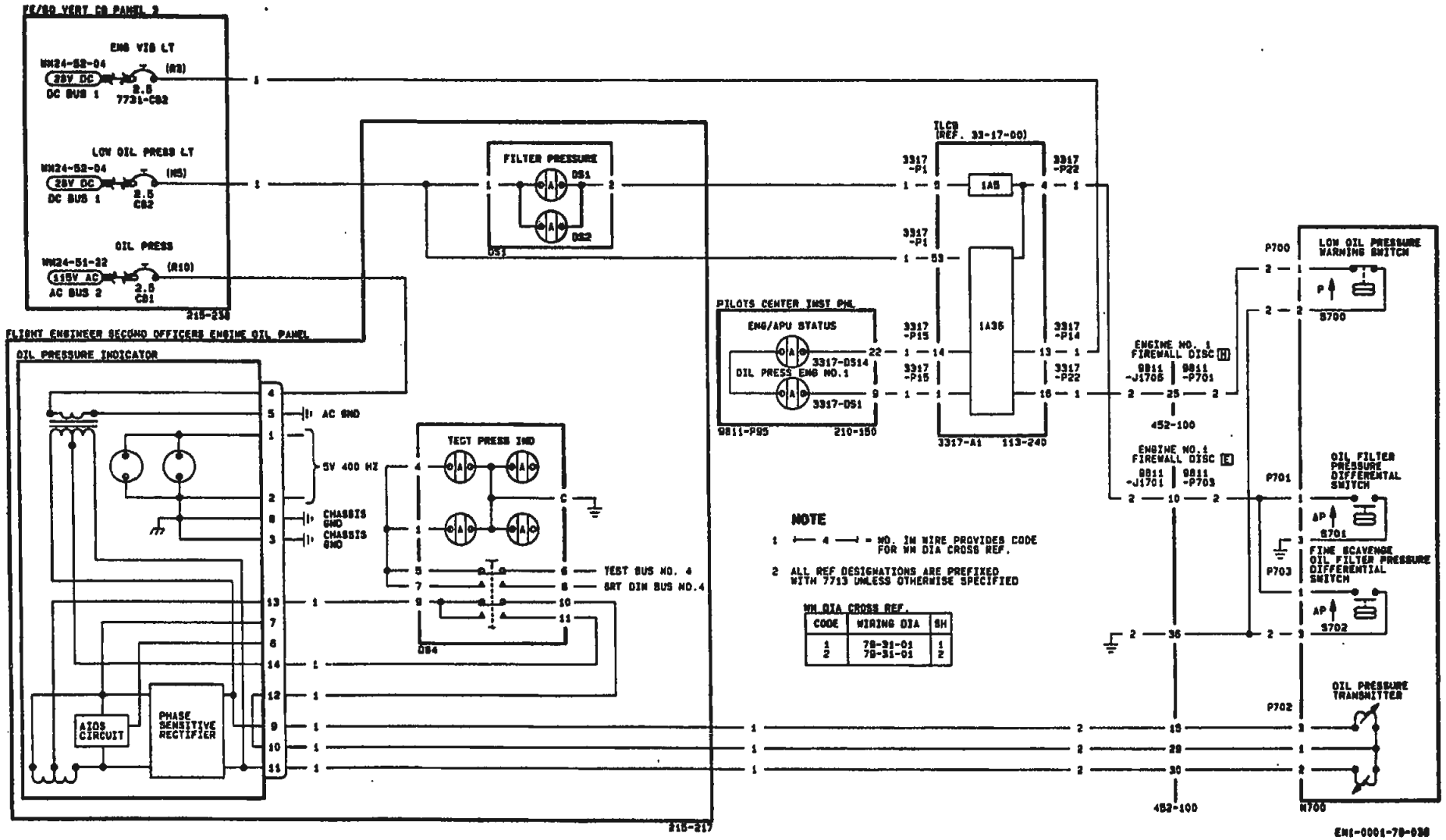
M1-0002-79-019

Oil Temperature Indication Fluctuates
Figure 104


OIL QUANTITY HIGH, LOW, OR FLUCTUATES
PREREQUISITES
ELECTRICAL PWR (24-41-00)
CB: CB3-R14
1 DEPRESS INDICATOR TEST (BITE) ACTUATOR. DOES POINTER DRIVE TO 12 O'CLOCK POSITION?
NO
5 REPLACE OIL QUANTITY INDICATOR (79-37-02).
YES
2 CHECK ELECTRICAL CONNECTORS AT INDICATOR, TRANSMITTER AND FIREWALL FOR SECURITY (WM 79-37-01, 02, OR 03). ARE CONNECTORS SECURE?
NO
6 TIGHTEN LOOSE CONNECTOR.
YES
3 REPLACE OIL QUANTITY TRANSMITTER (79-37-01). DOES FAULT PERSIST?
NO
7 REJECT OIL QUANTITY TRANSMITTER.
YES
4 REPLACE OIL QUANTITY INDICATOR (79-37-02). DOES FAULT PERSIST?
NO
8 REJECT OIL QUANTITY INDICATOR.
YES
9 CHECK AIRCRAFT WIRING (WM 79-37-01, 02, OR 03).

M1-0002-79-017

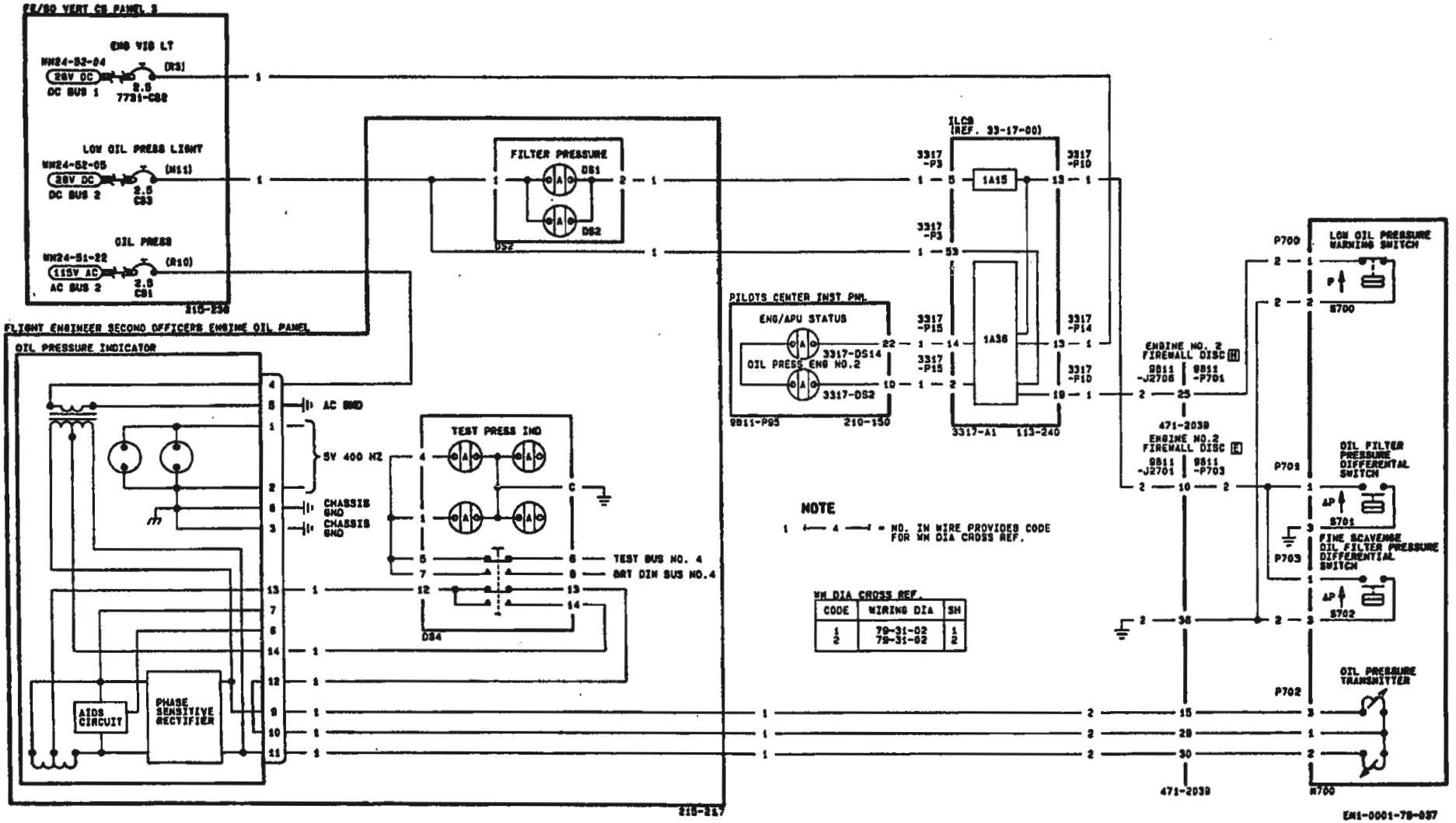
Oil Quantity Indication Fluctuates
Figure 105



R Engine No. 1 Oil Pressure Indicating and Warning System Schematic
R SCHEM 1

EFFECTIVITY: ALL

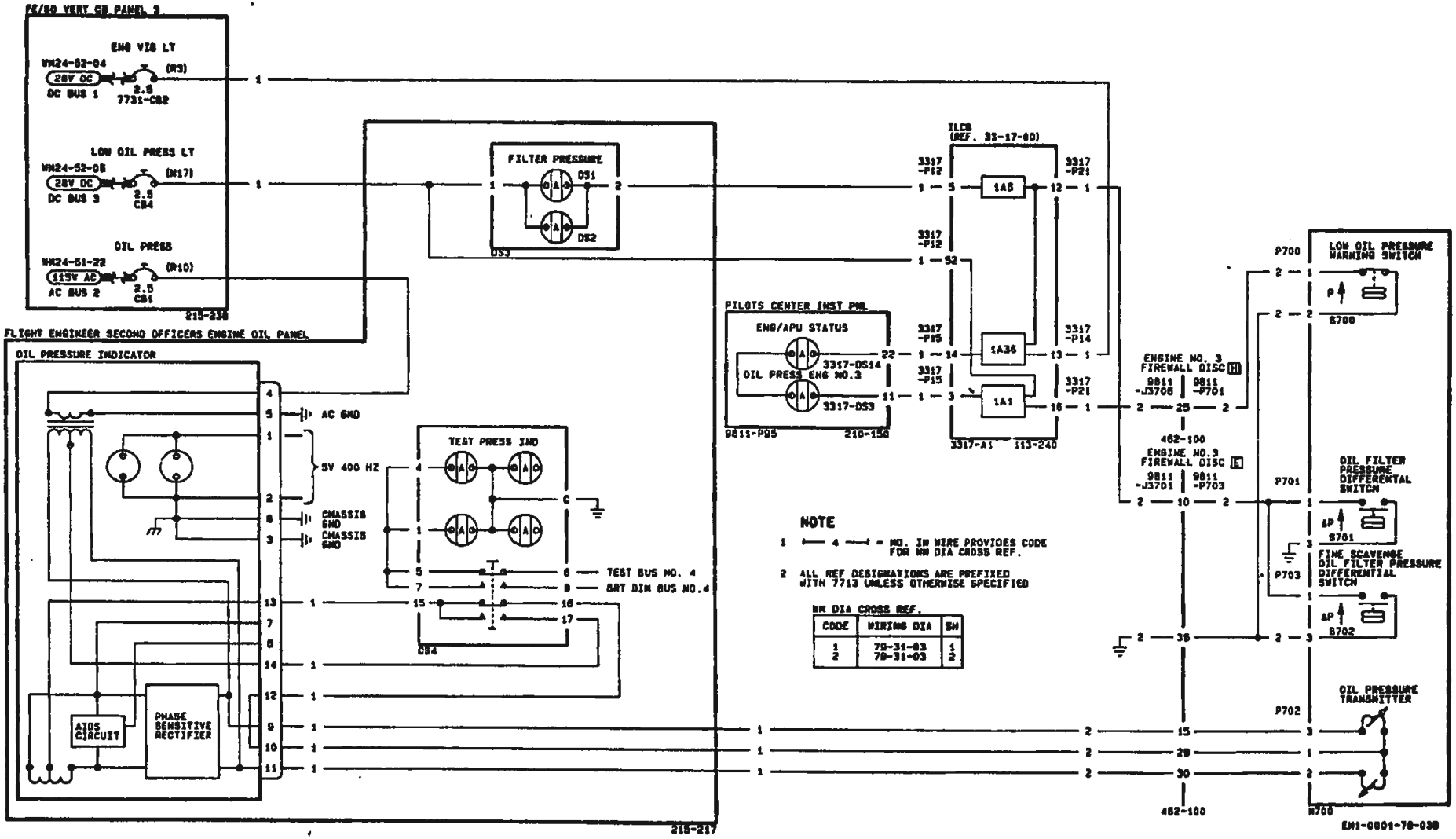
001B



R Engine No. 2 Oil Pressure Indicating and Warning System Schematic
R SCHEM 2

EFFECTIVITY: ALL

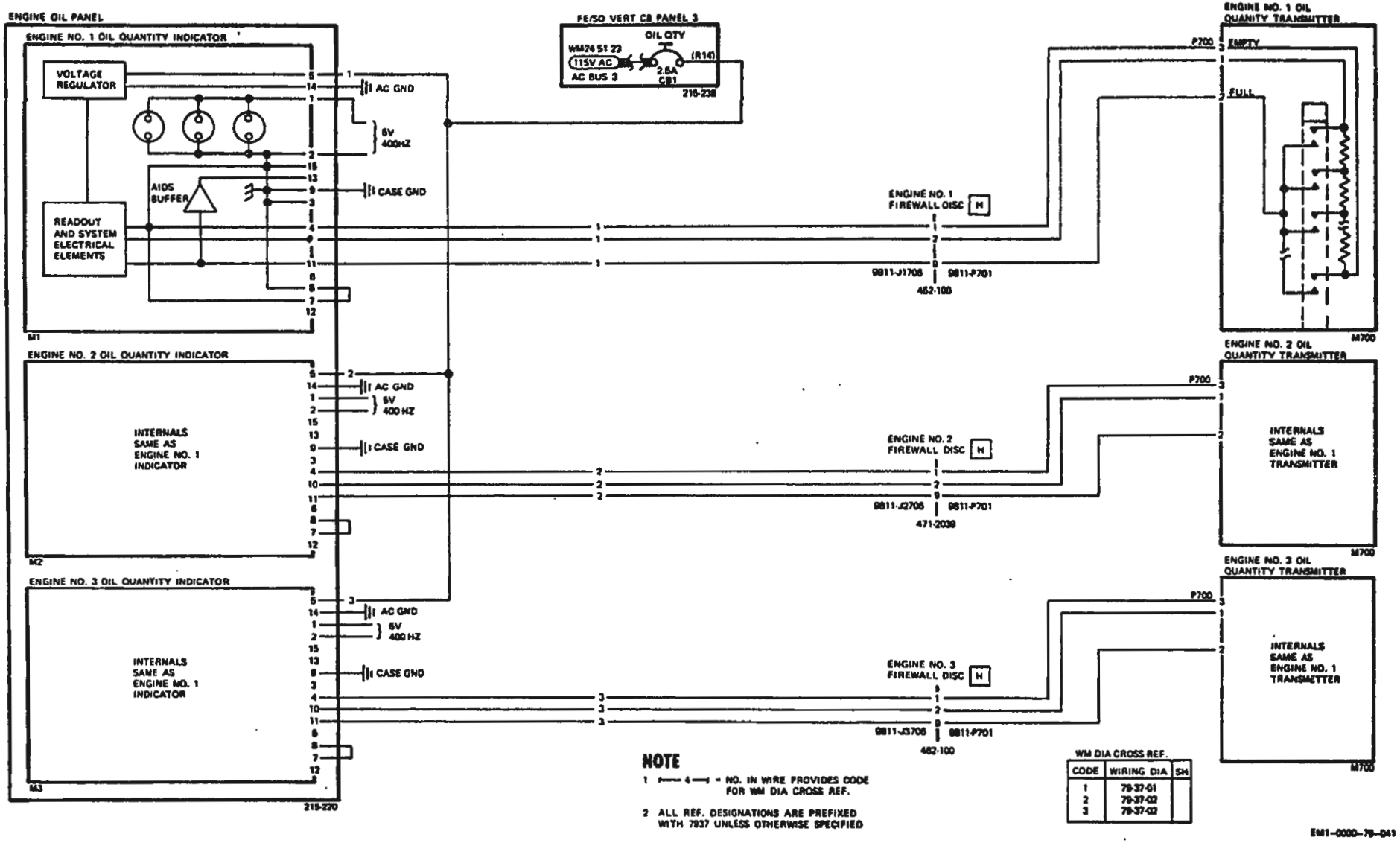
001B



R Engine No. 3 Oil Pressure Indicating and Warning System Schematic
R SCHEM 3

EFFECTIVITY: ALL

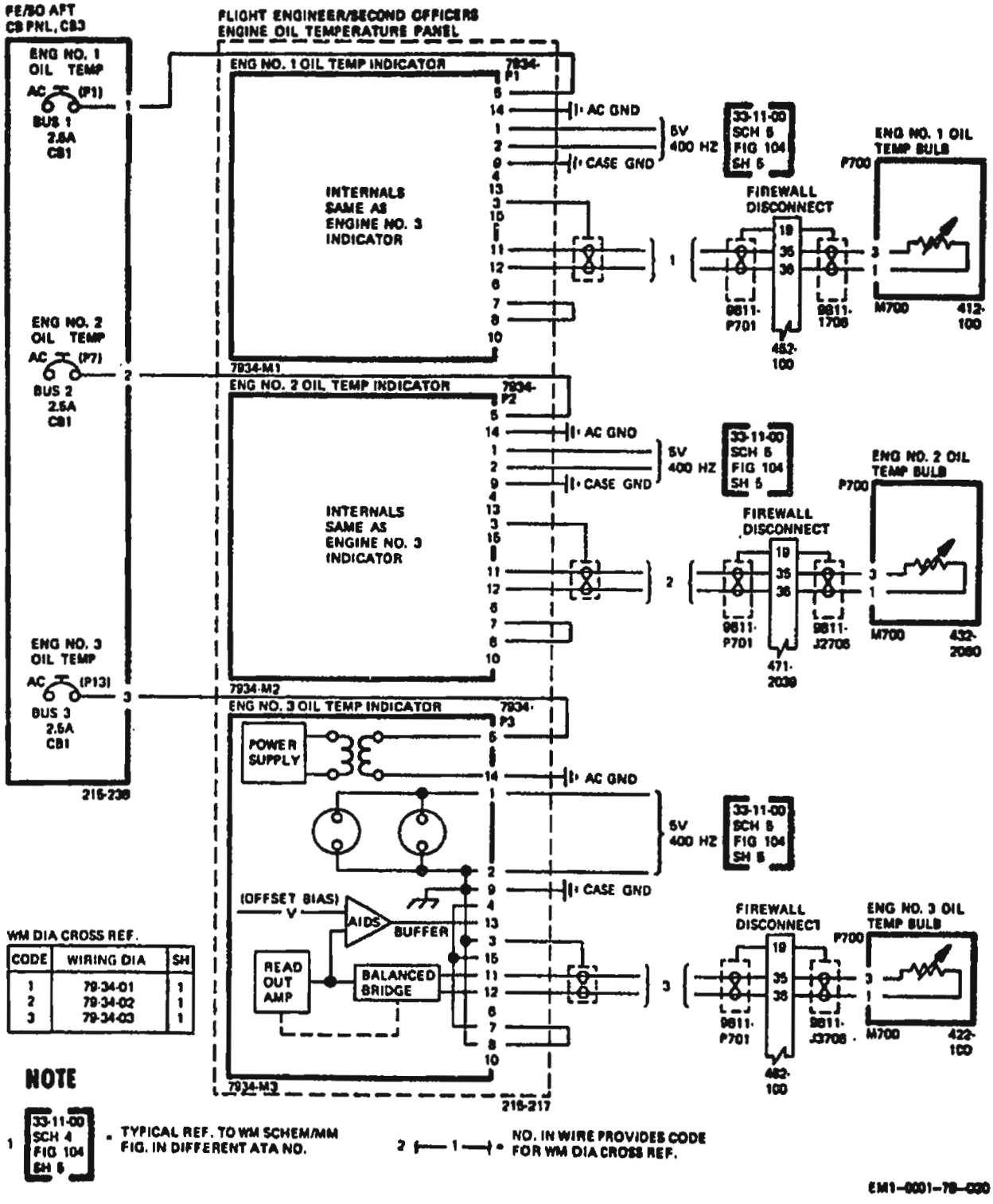
001B



R R Oil Quantity Indicating System Schem 4

EFFECTIVITY: ALL

001B



R Oil Temperature Indicating System Schematic
R SCHEM 5

R EFFECTIVITY: ALL
R
001B

OIL PRESSURE INDICATING AND WARNING SYSTEM DESCRIPTION AND OPERATION

1. General

The engine oil pressure indicating and warning system provides analog data and illuminated annunciator-type warnings concerning the status of engine oil pressure (Ref. Fig. 1). The system consists of the following components:

A. One engine oil pressure transmitter on each engine.

B. One oil filter pressure differential switch and, on engines incorporating SB 71-2608, one fine scavenge oil filter pressure differential switch, on each engine.

C. One engine low oil pressure warning switch on each engine.

D. Three oil pressure indicators on the Flight Engineer/Second Officers ENGINE OIL panel.

E. Three amber oil low-pressure FILTER pressure differential indicator lights on the Flight Engineer/Second Officers ENGINE OIL panel.

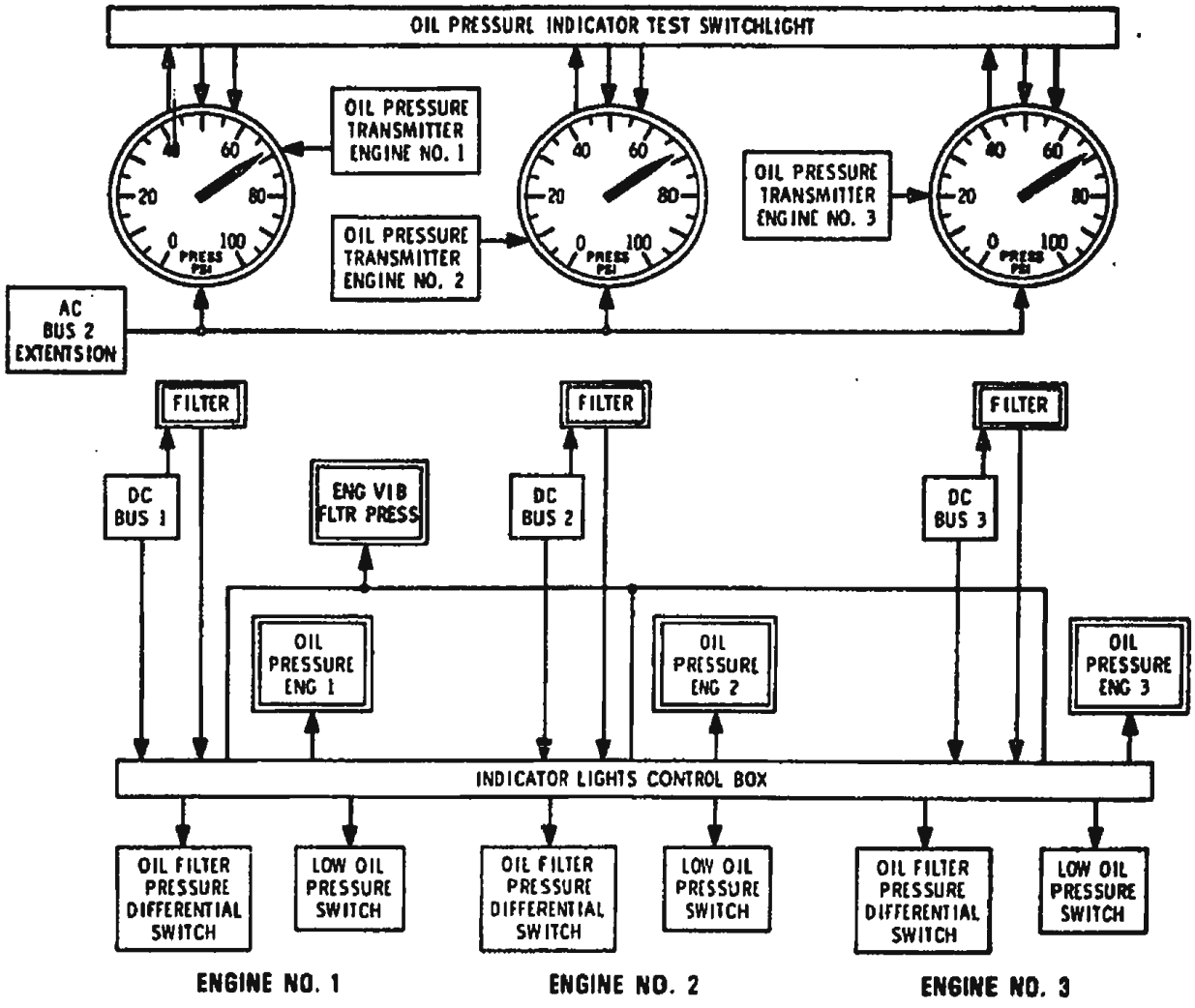
F. One oil pressure indicator TEST switchlight on the Flight Engineer/Second Officers ENGINE OIL panel.

G. Three amber low oil pressure indicator lights on the pilots center instrument panel.

H. One ENG VIB FLTR PRESS indicator light on the pilots CAWP panel (Ref. 77-31-00).

The individual outputs of the oil pressure transmitters drive the three oil pressure indicators on the ENGINE OIL panel (Ref. Fig. 2). Actuation of the TEST switchlight causes each
R indicator pointer to drive to the 9 o'clock position.

The sending units are located in zones 412, 422 and 432, on the front face of the oil tank and, on engines incorporating SB 71-2608, on the fine scavenge oil filter. The oil pressure transmitter and the low oil pressure warning switch are positioned in the oil system so that each senses feed and return oil pressures. The oil filter pressure differential switch is positioned so that it senses feed oil pressure at the inlet and outlet of the pressure filter. On engines incorporating SB 71-2608, the fine scavenge filter pressure differential switch senses return oil pressure at the inlet and outlet of the fine scavenge filter.

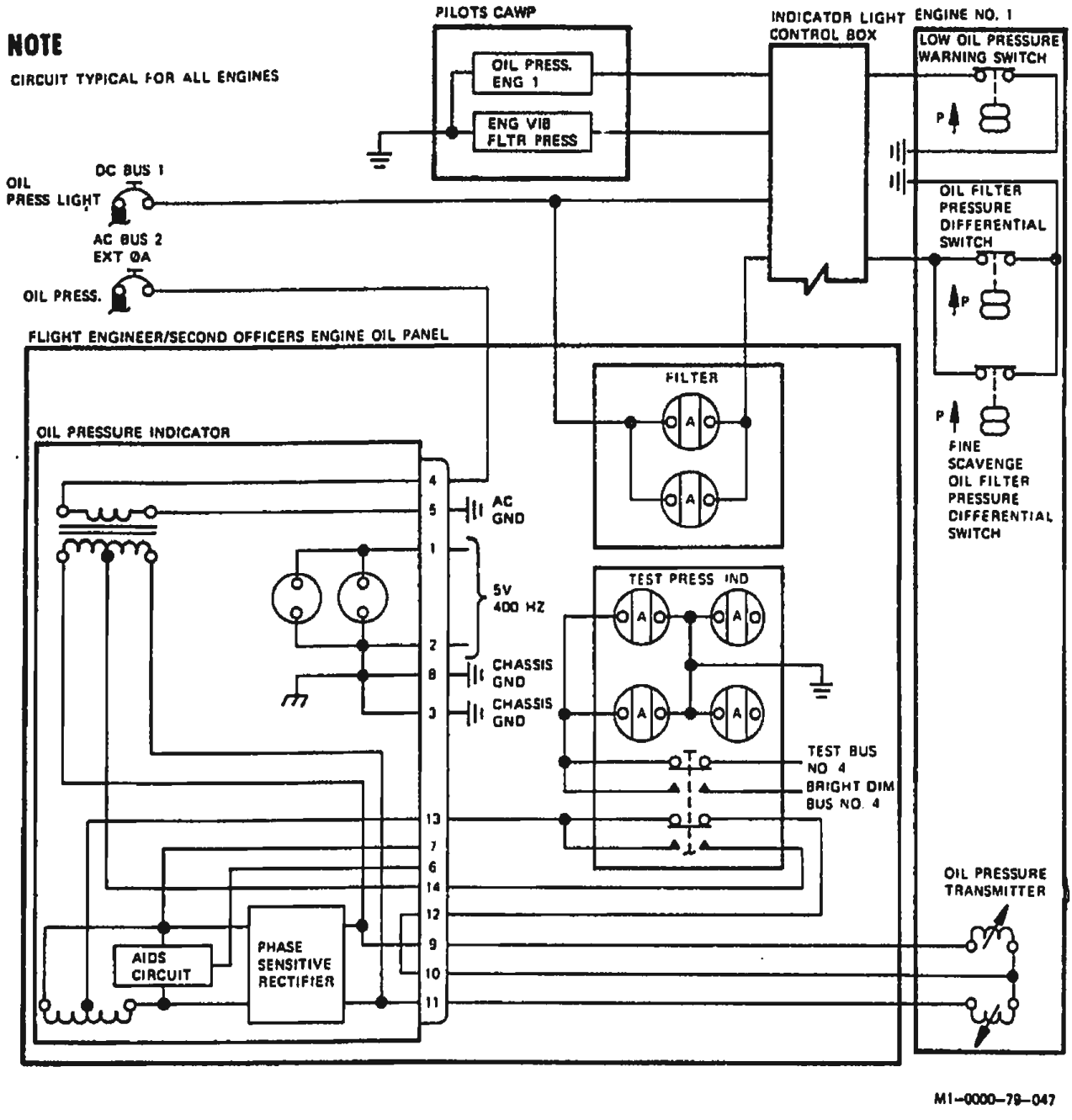


M1-0000-79-046

R Oil Pressure Indicating and Warning System Block Diagram
R Figure 1

EFFECTIVITY: ALL

001B



R Oil Pressure Indicating and Warning System Simplified Schematic
R Figure 2

R With the engine static and the aircraft electrical power on, the
R engine low oil pressure warning switch completes the circuit to the warning light which comes on. As there is no pressure in the oil system, the oil pressure indicator reads zero and the oil filter pressure differential warning switch breaks the circuit to the warning light which remains out.

When the engine is started, the subsequent increase of differential pressure between feed and return oil acting on the pressure transmitter, results in an electrical output signal which is displayed at the flight station indicator as engine oil
R pressure. At a predetermined oil pressure differential, the
R engine low oil pressure warning switch is actuated and breaks the circuit to the warning light, which goes out.

If, during engine operation, oil pressure falls, the reduced electrical output signal from the oil pressure transmitter will result in a reduced indicator reading. Should oil pressure
R continue to fall, the engine low oil pressure warning switch is actuated at a predetermined setting and completes the circuit to the warning lights which come on.

During normal engine operation, the oil filter pressure differential warning lights are out. If, however, the pressure differential across either the pressure filter or the fine scavenge filter increases, its pressure differential switch is actuated at a predetermined setting and completes the circuit to the warning lights which come on.

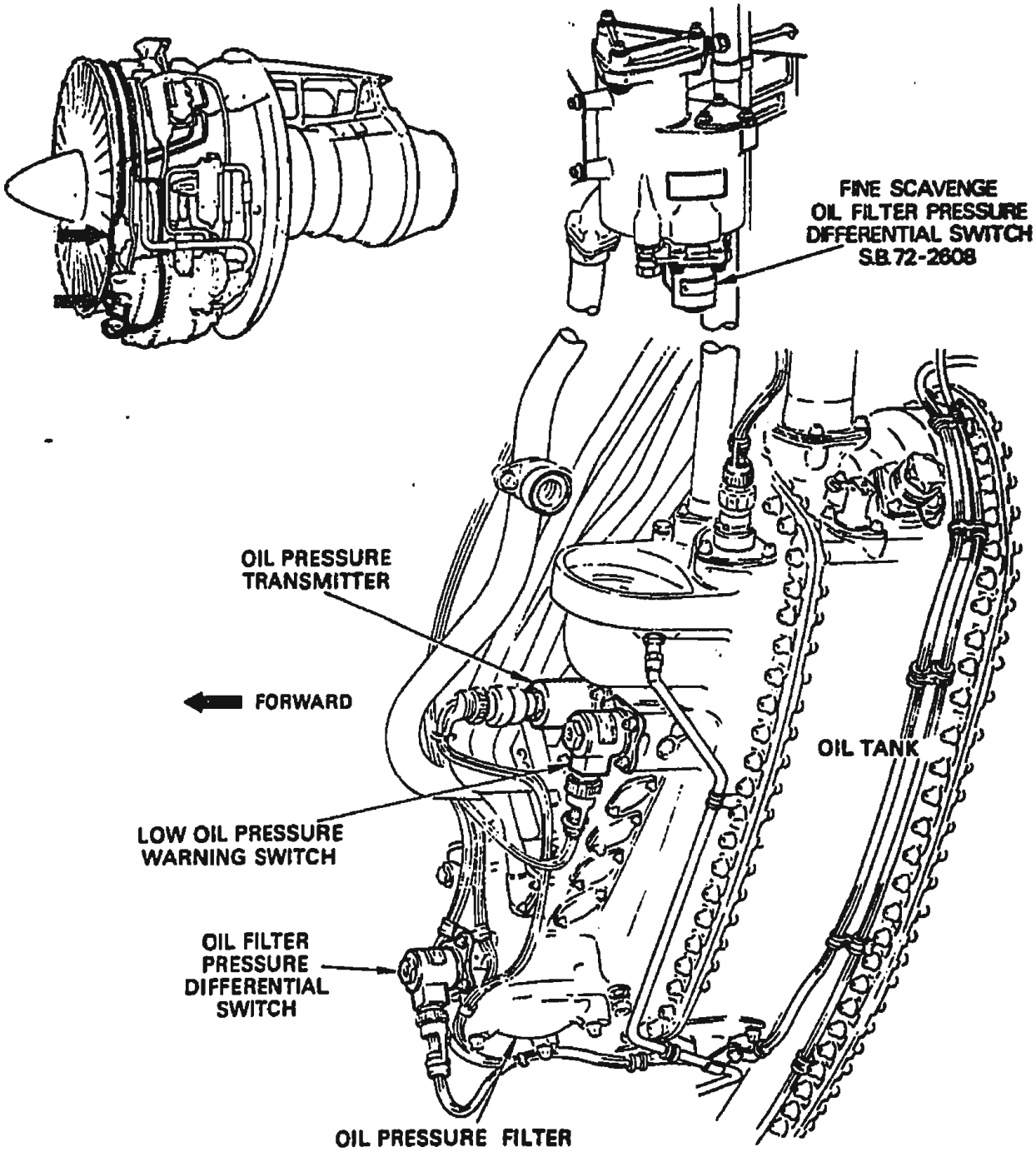
2. Oil Pressure Transmitter

A. Description and Operation

The oil pressure transmitter (Ref. Fig. 3) is mounted on the front face of the oil tank, zones 412, 422, and 432. The transmitter, basically comprises a cylindrical case, housing two identical stator windings surrounding an armature carried on a central spindle, which locates to a capsule stack. Two holes in a base plate align with holes in the mounting face so that one connects to main feed oil pressure, which is fed to a chamber surrounding the capsule stack, and one to return oil pressure, which is fed to the inside of the capsule stack.

The two branches of the transmitter electrical circuit connect with the aircraft indicator circuit through an electrical connector mounted on the transmitter case.

Variation in the differential oil pressure causes the capsule stack to expand or contract, imparting linear movement to the spindle and armature. The resultant change



Oil Pressure Engine Units
Figure 3

in inductance of the stator windings and therefore the ratio of current to the two branches of the aircraft indicator circuit, is shown as an increased or decreased indicator reading.

3. Oil Filter Pressure Differential Switch

A. Description and Operation

The oil filter pressure differential switch (Ref. Fig. 3) is mounted on the oil pressure filter housing, zones 412, 422, and 432. The switch consists basically of a metal body that houses an electrical switch and connector, and a pressure sensing bellows to which oil is supplied through two holes in the mounting base. Oil from the filter inlet is fed to the inside of the bellows and oil from the filter outlet is fed to the chamber surrounding the bellows. Expansion of the bellows is opposed by a snap action spring, which prevents the bellows actuating the switch until a predetermined oil pressure differential is reached. An increase in filter inlet pressure or a decrease in filter outlet pressure expands the bellows and, at the predetermined differential pressure, the switch is actuated to complete the circuit to the warning light.

4. Engine Low Oil Pressure Warning Switch

A. Description and Operation

The engine low oil pressure warning switch (Ref. Fig. 3) is mounted on the front face of the oil tank in zones 412, 422, and 432. The switch is similar in construction to the oil filter pressure differential switch. Feed oil is supplied to the inside of the bellows and return oil is supplied to the chamber surrounding the bellows. A decrease in feed oil pressure or an increase in return oil pressure will contract the bellows and, at a predetermined differential pressure, the switch is actuated to complete the circuit to the warning light.

5. Oil Pressure Indicator

CR A. Oil pressure indicators on L1011 have in the past been
CR written up for a difference in dial face yellow band
CR markings. Investigation indicates that L1011 aircraft were
CR delivered with two different oil pressure indicators.

CR B. The early indicator has a dial face that has a yellow band
CR from 35 to 42 PSI. Later units have a yellow band from 35

CR to 40 PSI. Both units are under the same stock number and
CR are interchangeable. Flight crews have been advised of this
CR difference and requested not to write up as a discrepancy.
CR In case this occurs, use this MSL as authority to sign off
CR logs.

R C. Description

The oil pressure indicator contains a dc moving coil ratiometer movement which operates on 115V, 400-Hz power using a toroidal transformer and a phase-sensitive rectifying circuit. Integral lighting of the indicator scale plate is accomplished by four lamps mounted on a printed wiring board in the indicator. A circular reflector around the scale plate ensures an even distribution of light (Ref. Fig. 4).

The movement assembly comprises two coils wound side-by-side on an aluminum former which is pivoted so that, when energized, it will rotate in the field of a permanent magnet. The two coils are connected in opposition and have a common connection.

R D. Operation

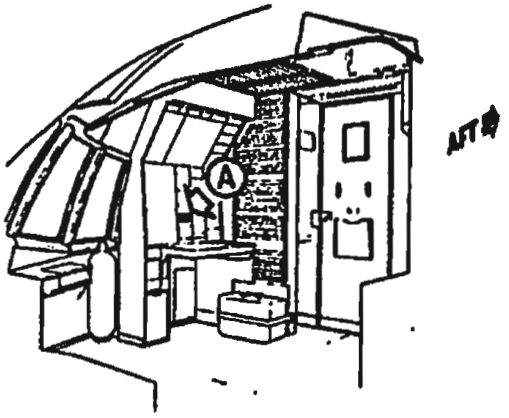
The two coils of the ratiometer movement form one half of a bridge circuit (Ref. Fig. 5). The tapped coil of the oil pressure transmitter comprises the other half of the bridge circuit. Rectification of the 400-Hz signal is necessary to operate the movement. This is accomplished by the phase-sensitive rectifying circuit.

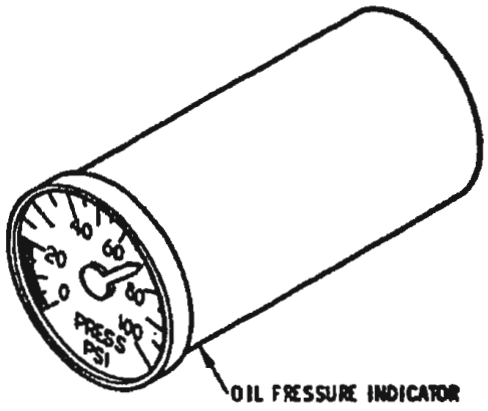
With the transmitter armature centrally positioned, the currents flowing in the movement coils are equal in value but opposite in polarity, resulting in the pointer indicating approximately a mid-scale position. As the position of the transmitter armature varies with changing oil pressure, the bridge circuit becomes unbalanced and a current flows in each ratiometer movement coil, one increasing and the other decreasing. Thus, a torque is produced which is proportional to the difference in current levels, causing the pointer to deflect from the central position.

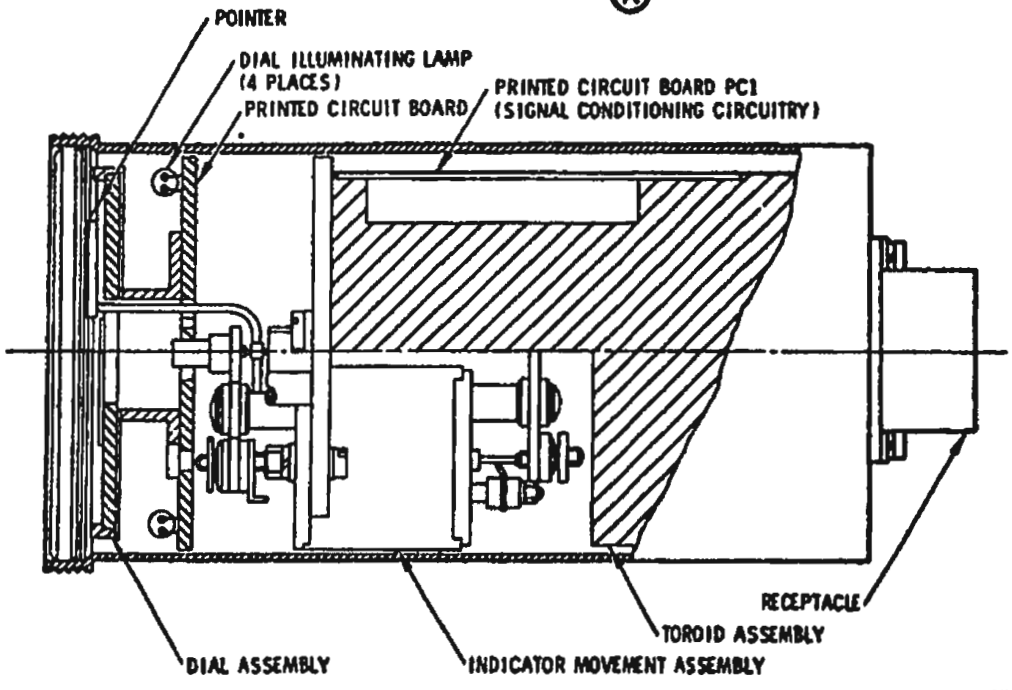
6. Fine Scavenge Filter Pressure Differential Switch (SB71-2608)

A. Description and Operation

The fine scavenge filter pressure differential switch (Ref. Fig 3) is mounted on the bottom face of the fine scavenge filter, in zones 412, 422, and 432. The switch is identical







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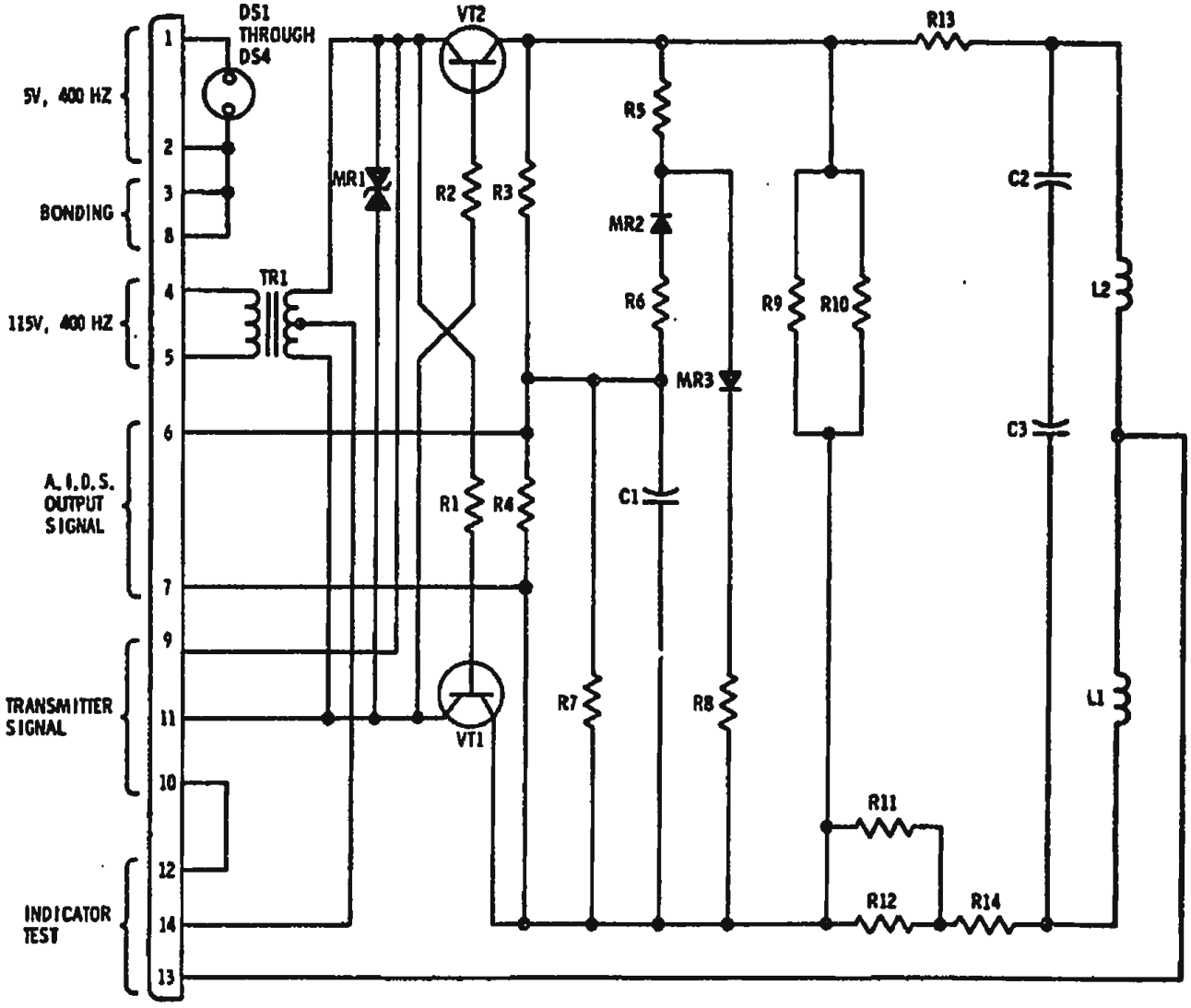
M1-0001-79-006

Oil Pressure Indicator
Figure 4



EM1-A00-79-005

Oil Pressure Indicator Schematic
Figure 5

R
R
001B

EFFECTIVITY: ALL

in construction and method of operation to the existing oil filter pressure differential switch except for a differently positioned baulking feature and a lower operating setting.

OIL PRESSURE INDICATING AND WARNING SYSTEM - MAINTENANCE PRACTICES

1. Deactivation

R NOTE: This deactivation procedure applies only when an aircraft
R is to be dispatched in accordance with the MEL.

If the engine is to be operated with an inoperative oil FILTER PRESSURE light, determine that the malfunction is in the caution system; inspect the pressure filter daily (Ref. 72-01-00, Oil System - Inspection and Check).

OIL PRESSURE INDICATING AND WARNING SYSTEM - ADJUSTMENT AND TEST

1. Referenced Procedures

24-41-00	External Power/Ground Service System - Maintenance Practices
71-00-00	Power Plant - Trouble Shooting
71-00-00	Power Plant - Adjustment and Test

2. Adjustment/Test

NOTE: Reference 71-00-00, Trouble shooting for any abnormal oil pressure indications.

A. Operational Test

(1) Oil Pressure Transmitter

(a) Turn on electrical power (Ref. 24-41-00).

(b) On ENGINE OIL panel, zone 215, verify that engine oil pressure indicator pointers move to 0 psi.

(c) Turn off electrical power (Ref. 24-41-00).

(d) During next engine start, observe each oil pressure indicator to verify that pointer moves smoothly within specified limits (Ref. 71-00-00) as pressure increases.

(e) When engines are shut down, observe indicators to verify that readings decrease smoothly to 0 psi (Ref. 71-00-00, Adjustment/Test).

(2) Oil Filter and Fine Scavenge Oil Filter Pressure Differential Switches.

(a) Turn on electrical power (Ref. 24-41-00).

(b) Verify that the following indicator lights do not come on when power is applied: On ENGINE OIL panel, zone 215, three oil filter pressure differential indicator lights (amber), and on the pilots center instrument panel, zone 210, one ENG VIB FLTR PRESS indicator light.

R

(c) Turn off external power (Ref. 24-41-00).

(d) During the next engine start, verify that the indicator lights [Ref. Step 2A(2)(b)] do not come on.

(3) Low Oil Pressure Warning Switch

(a) Turn on external power (Ref. 24-41-00).

(b) On the pilots center instrument panel, verify that the oil pressure warning indicator lights come on.

(c) Turn off external power (Ref. 24-41-00).

(d) During the next engine start, verify that the low oil pressure warning indicator lights go out when engines reach ground idle rpm.

(e) During engine shutdown, verify that the indicator lights come on below ground idle rpm.

OIL PRESSURE TRANSMITTER - REMOVAL AND INSTALLATION

1. Equipment and Materials

Degreasing Fluid, British Spec B.S. 4487:1969 (Clorothene NU, Inhibisol, or Genklene), or equivalent

Jointing Compound, British Spec DTD.900/4586, (Hylomar light) or equivalent

Stiff-bristle brush

Protective caps

R Seal rings

2. Referenced Procedures

70-02-01	Rubber Sealing Rings, Identification, Lubrication, and Fitting
71-11-00	Engines No. 1 and No. 3 Cowling - Servicing
71-12-01	LH and RH Lower Hinged Cowl - Servicing
79-31-00	Oil Pressure Indicating and Warning System - Adjustment and Test

3. Removal/Installation

A. Removal

(1) On Flight Engineer/Second Officers aft circuit breaker panel CB3, zone 215, open and tag applicable circuit breakers OIL PRESS (R10) and START AIR VALVE (N3, N9, or N15).

(2) Open LH hinged cowl 413A or 423A for engines No. 1 or 3 (Ref. 71-11-00), or lower LH hinged cowl 433AL for
R engine No. 2 (Ref. 71-12-01).

(3) Disconnect electrical receptacle connector from pressure transmitter (Ref. Fig. 401), and install protective caps.

R WARNING: THE SYNTHETIC LUBRICATING OIL USED IN THIS ENGINE
R MAY CAUSE IRRITATION, IF SKIN CONTACT IS REPEATED
R OR PROLONGED.

IMMEDIATELY AFTER SHUT DOWN ENGINE OIL TEMPERATURE REMAINS HIGH, THEREFORE, EXTREME CARE MUST BE OBSERVED WHEN WORKING NEAR TO OR ON ENGINE OIL SYSTEM COMPONENTS AND TUBES.

CAUTION: PREVENT LUBRICATING OIL USED IN ENGINE OIL SYSTEM FROM COMING INTO CONTACT WITH PAINT AND CERTAIN TYPES OF RUBBER NOT NORMALLY USED IN ENGINE APPLICATIONS.

(4) Separate transmitter from front face of high-speed gearbox oil tank.

(5) Remove and discard seal rings. Install protective caps.

B. Installation

(1) Verify that circuit breakers opened in Step 3A(1) are open and tagged.

(2) Remove protective caps from oil ports.

WARNING: AVOID SKIN CONTACT AND INHALING THE VAPOR WHEN USING DEGREASING FLUID.

(3) Moisten cloth with degreasing fluid and remove all traces of old jointing compound from oil tank front face and transmitter mounting face.

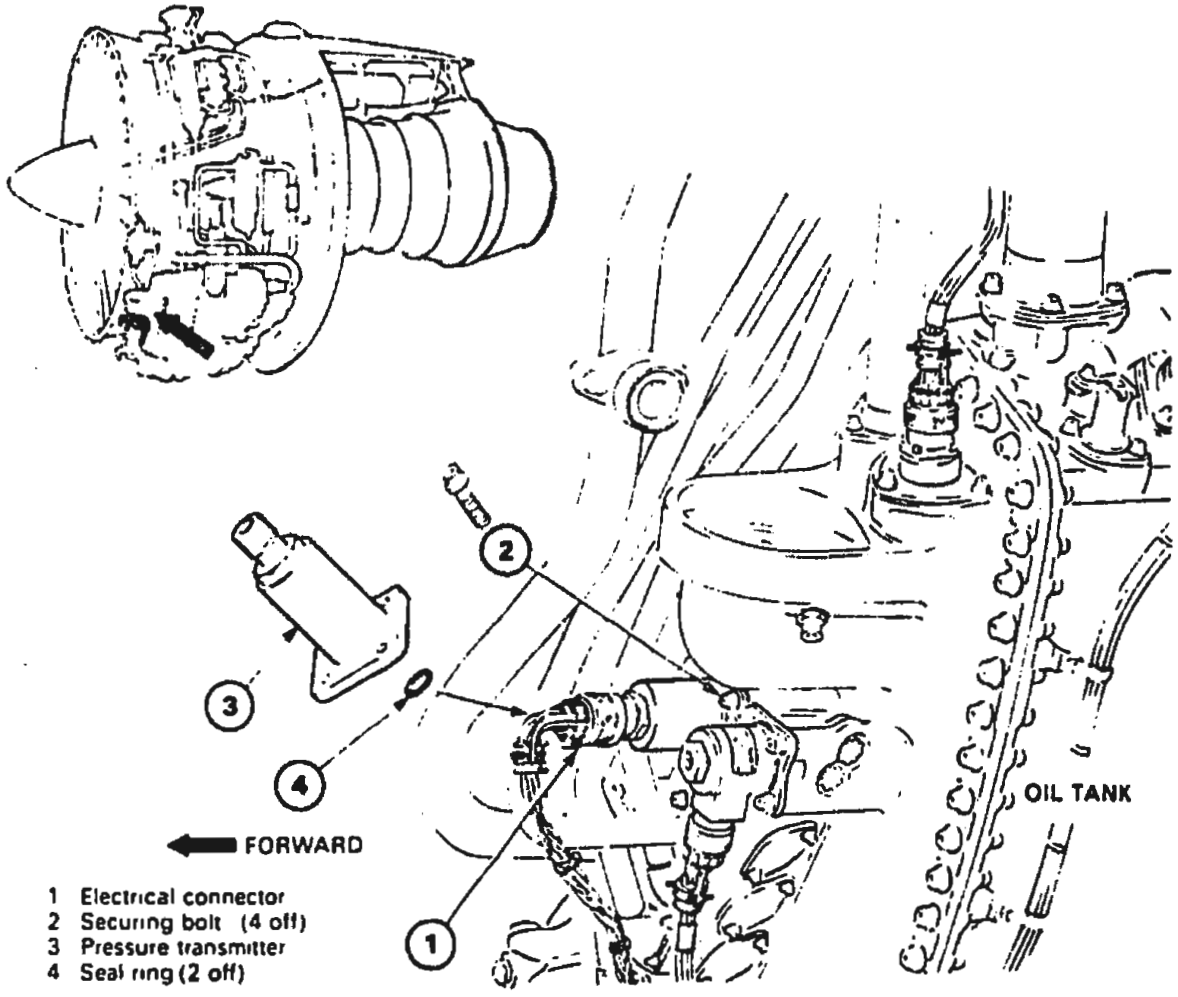
CAUTION: DO NOT ALLOW JOINTING COMPOUND TO ENTER OIL PASSAGES.

(4) Using stiff-bristle brush, apply thin film of jointing compound to mating faces of oil tank and transmitter. Compound must be allowed to air-dry for at least 10 minutes.

(5) Lubricate seal rings (Ref. 70-02-01) and install in the oil port recesses in the oil tank front face (Ref. Fig. 401). Verify that retaining ring for each seal is not displaced.

(6) While ensuring positive alignment of transmitter and mounting dowel, install transmitter on gearbox oil tank.

(7) Remove protective caps and mate electrical connectors.



Oil Pressure Transmitter - Removal and Installation
Figure 401

(8) Remove tags and close circuit breakers opened in Step 3A(1).

(9) Perform an operational test on the oil pressure indicating and warning system (Ref. 79-31-00).

(10) Close cowl (Ref. 71-11-00 or 71-12-01).

OIL FILTER PRESSURE DIFFERENTIAL SWITCH REMOVAL AND INSTALLATION

1. Equipment and Materials

Degreasing Fluid, British Spec B.S. 4487:1969 (Chlorothene NU, Inhibisol, or Genklene), or equivalent

Jointing Compound, British Spec DTD.900/4586 (Hylomar light), or equivalent

Stiff-bristle brush

Protective caps

R Seal rings

2. Referenced Procedures

70-02-01	Rubber Sealing Rings, Identification, Lubrication and Fitting
71-11-00	Engines No. 1 and No. 3 Cowling - Servicing
71-12-01	LH and RH Lower Hinged Cowl - Servicing
79-31-00	Oil Pressure Indicating and Warning System - Adjustment and Test

3. Removal/Installation

A. Removal

(1) On Flight Engineer/Second Officers aft circuit breaker panel CB3, zone 215, open and tag applicable circuit breakers OIL PRESS (R10) and applicable OIL LO PRESS LIGHT (N5, N11, or N17) and START AIR VALVE (N3, N9, or N15).

(2) Open LH hinged cowl 413A or 423A for engine No. 1 or 3 (Ref. 71-11-00) or lower hinged cowl 433AL for engine No. 2 (Ref. 71-12-01).

(3) Disconnect electrical receptacle connector from pressure differential switch plug (Ref. Fig. 401). Install protective caps.

WARNING: THE SYNTHETIC LUBRICATING OIL USED IN THIS ENGINE
R MAY CAUSE IRRITATION, IF SKIN CONTACT IS REPEATED
R OR PROLONGED.

IMMEDIATELY AFTER SHUT DOWN ENGINE OIL TEMPERATURE REMAINS HIGH, THEREFORE, EXTREME CARE MUST BE OBSERVED WHEN WORKING NEAR TO OR ON ENGINE OIL SYSTEM COMPONENTS AND TUBES.

CAUTION: PREVENT LUBRICATING OIL USED IN ENGINE OIL SYSTEM FROM COMING INTO CONTACT WITH PAINT AND CERTAIN TYPES OF RUBBER NOT NORMALLY USED IN ENGINE APPLICATIONS.

DO NOT TWIST, BEND, OR FORCE SENSOR ELEMENT ASSEMBLY.

(4) Open quick-release fastener at sensor element bracket.

(5) Disengage low-tension (LT) harness cable clips from LT harness support bracket.

(6) Remove oil filter pressure differential switch mounting bolts.

(7) Move sensor element bracket out of harness support bracket to obtain clearance. Lift switch from filter front face to clear dowel and remove switch.

(8) Remove and discard seal rings from oil port recesses in filter. Install protective caps on all ports.

B. Installation

(1) Verify that circuit breakers opened in Step 3A(1) are open and tagged.

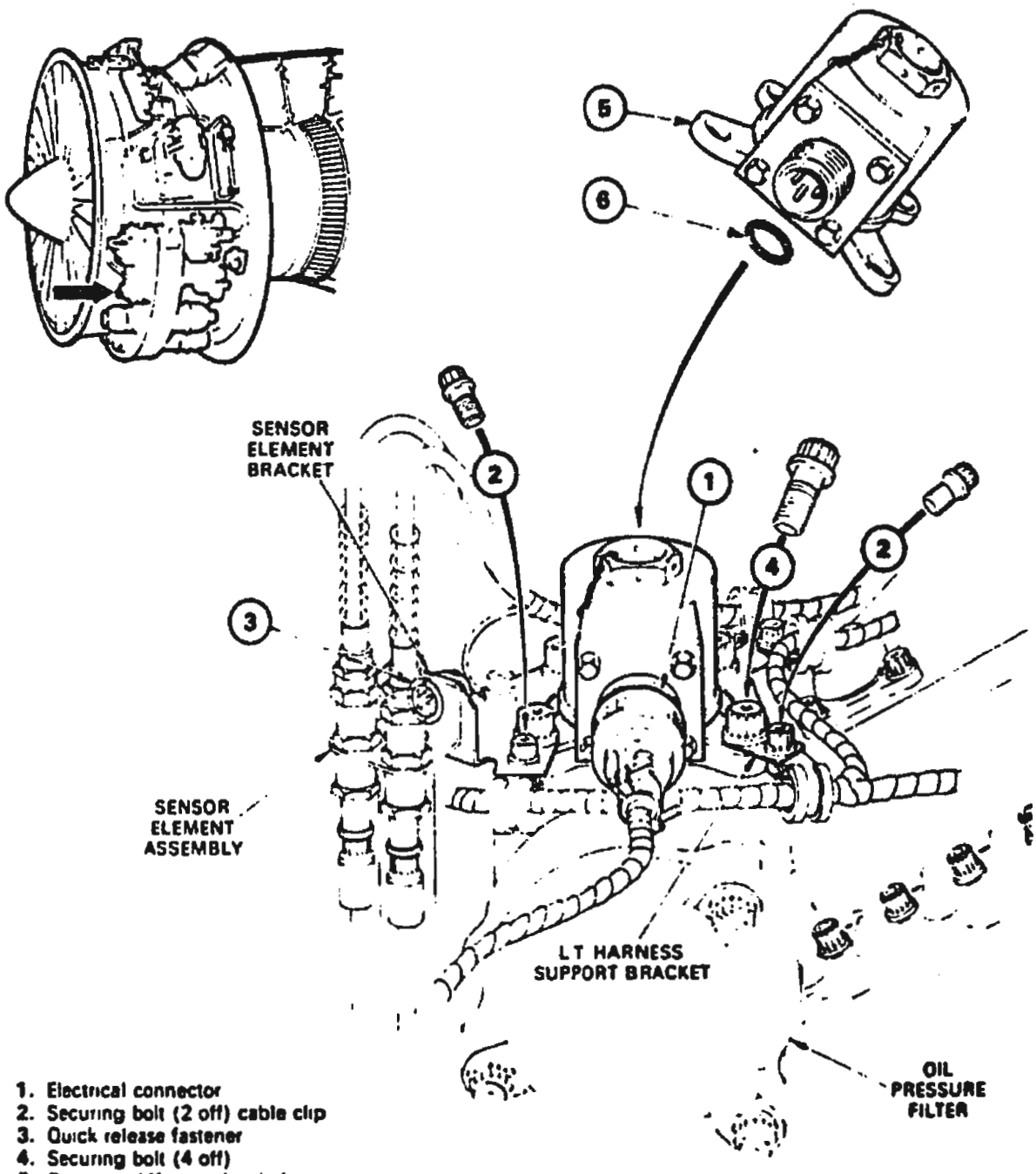
(2) Remove protective caps from oil ports on pressure switch and oil pressure filter.

WARNING: AVOID SKIN CONTACT AND INHALING VAPOR WHEN USING DEGREASING FLUID.

(3) Moisten cloth with degreasing fluid and remove all traces of old jointing compound from oil filter front face and switch mounting face.

CAUTION: DO NOT ALLOW JOINTING COMPOUND TO ENTER OIL PASSAGES.

(4) Using stiff-bristled brush, apply thin film of jointing compound to mating faces of oil filter and switch.



1. Electrical connector
2. Securing bolt (2 off) cable clip
3. Quick release fastener
4. Securing bolt (4 off)
5. Pressure differential switch
6. Seal ring (2 off)

HH 9821
MI-0100-79-401
25631

R Oil Filter Pressure Differential Switch - Removal and Installation
R Figure 401

EFFECTIVITY: ALL

001B

Compound must be allowed to air-dry for at least 10 minutes.

(5) Lubricate seal rings (Ref. 70-02-01) and install in the oil port recesses in the switch mounting face of the oil filter. Verify that retaining ring for each seal is not displaced.

(6) Position pressure differential switch on filter mounting face, ensuring correct location by alignment with dowel.

(7) Align sensor element bracket and LT harness support bracket with switch mounting holes. Secure switch with bolts.

(8) Engage sensor element bracket quick-release fastener.

(9) Remove protective caps and connect electrical components.

(10) Remove tags and close circuit breakers opened in Step 3A(1).

(11) Perform operational test of oil pressure indicating and warning systems (Ref. 79-31-00).

(12) Close cowlings opened in Step 3A(2) (Ref. 71-11-00 or 71-12-01).

CR C. On Condition Test.

CR (1) Actuation set-point testing and adjustment for pressure switch 21 SN04-26C (R&R 296-5020)

CR (a) Attach the pressure switch to the test equipment (as shown in Figure 402). Apply 30 PSIG air or nitrogen to both ports simultaneously.

CR (b) Close shutoff valve to trap pressure in the vent port side of the pressure switch.

CR (c) Slowly increase and decrease the pressure to the pressure port side to 5-10 PSIG above and below actuation values.

CR (1) On increasing differential pressure:

CR The electrical switch will open at 30.0 ±0.4 PSID.

CR (2) On decreasing differential pressure:

CR The electrical switch will close at 3PSI (max)
CR below actuation set-point.

CR NOTE: Will be determined by test lights or
CR audible click of snap-spring within main
CR housing.

CR (2) Actuation Set-Point Testing and Adjustment for Pressure
CR Switch 21SN04-104 (R&R 296-7279)

CR (a) Attach the pressure switch to the test equipment
CR (as shown in Figure 402). Apply 60 PSIG air or
CR nitrogen to both ports simultaneously.

CR (b) Close shutoff valve to trap pressure in the vent
CR port side of the pressure switch.

CR (c) Slowly increase and then decrease the pressure to
CR the pressure port side to from 5-10 psi above
CR actuation to from 2-5 psi below deactuation
CR valves.

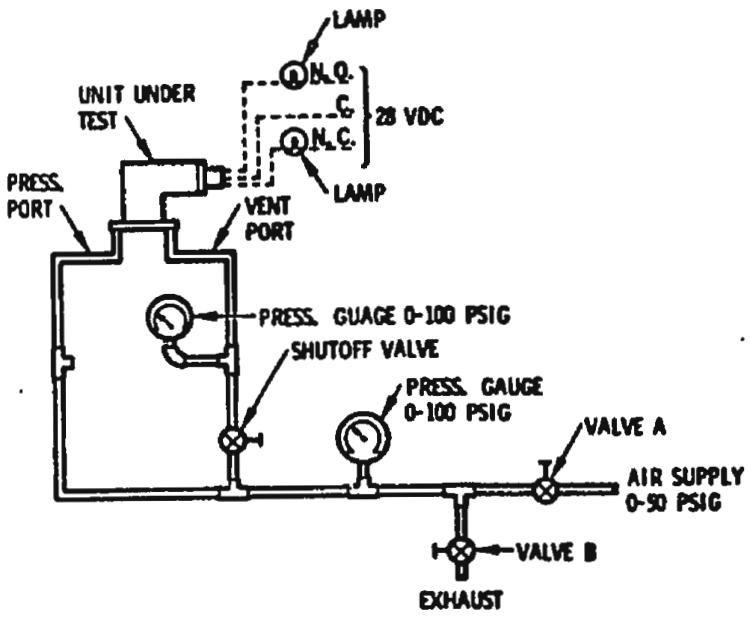
CR (1) On increasing differential pressure:

CR The electrical switch will actuate at 13 ±0.4
CR psid.

CR (2) On decreasing differential pressure:

CR The electrical switch must deactuate within -3
CR psi of the actuation value on increasing
CR pressure.

CR NOTE: Will be determined by test lights or
CR audible click of snap-spring within main
CR housing.



M1-0000-79-032

CR
CR

Test Setup For Oil Pressure Switches
Figure 402

R
R
0018

EFFECTIVITY: ALL

LOW OIL PRESSURE WARNING SWITCH - REMOVAL AND INSTALLATION

1. Equipment and Materials

Degreasing Fluid, British Spec B.S.4487:1969 (Chlorothene NU, Inhibisol, or Genklene), or equivalent

Jointing Compound, British Spec DTD.900/4586 (Hylomar light), or equivalent

Stiff-bristle brush

Protective caps

R Seal rings

2. Referenced Procedures

70-02-01	Rubber Sealing Rings, Identification, Lubrication and Fitting
71-11-00	Engines No. 1 and No. 3 Cowling - Servicing
71-12-01	LH and RH Lower Hinged Cowl - Servicing
79-31-00	Oil Pressure Indicating and Warning System - Adjustment and Test

3. Removal/Installation

A. Removal

(1) On Flight Engineer/Second Officers aft circuit breaker panel CB3, zone 215, open and tag applicable circuit breakers OIL PRESS (R10), OIL LO PRESS LIGHT (N5, N11, or N17), and START AIR VALVE (N3, N9, or N15).

(2) Open applicable LH hinged cowl 413A or 423A for engine No. 1 or 3 (Ref. 71-11-00) or LH lower hinged cowl 433AL for engine No. 2 (Ref. 71-12-01).

(3) Disconnect electrical receptacle connector from pressure warning switch (Ref. Fig. 401).

R WARNING: THE SYNTHETIC LUBRICATING OIL USED IN THIS ENGINE
R MAY CAUSE IRRITATION, IF SKIN CONTACT IS REPEATED
R OR PROLONGED.

IMMEDIATELY AFTER SHUT DOWN ENGINE OIL TEMPERATURE REMAINS HIGH, THEREFORE, EXTREME CARE MUST BE OBSERVED WHEN WORKING NEAR TO OR ON ENGINE OIL SYSTEM COMPONENTS AND TUBES.

CAUTION: PREVENT LUBRICATION OIL USED IN ENGINE OIL SYSTEM FROM COMING INTO CONTACT WITH PAINT AND CERTAIN KINDS OF RUBBER NOT NORMALLY USED IN ENGINE APPLICATIONS.

(4) Remove low oil pressure warning switch mounting bolts and remove switch.

(5) Remove and discard seal ring from oil port recess. Install protective caps on all ports.

B. Installation

(1) Verify that circuit breakers opened in Step 3A(1) are opened and tagged.

(2) Remove protective caps from all ports.

WARNING: AVOID SKIN CONTACT AND INHALING THE VAPOR WHEN USING DEGREASING FLUID.

(3) Moisten cloth with degreasing fluid and remove all traces of old jointing compound from switch mounting face on oil tank.

CAUTION: DO NOT ALLOW JOINTING COMPOUND TO ENTER OIL PASSAGES.

(4) Using stiff bristle brush, apply thin coat of jointing compound to mating faces of oil tank and switch. Compound must be allowed to air-dry for at least 10 minutes.

(5) Lubricate seal rings (Ref. 70-02-01) and install in oil port recess in oil tank cover (Ref. Fig. 401). Verify that retaining ring for each seal is not displaced.

(6) Position low oil pressure warning switch on oil tank cover mounting face, ensuring correct location by alignment with dowel.

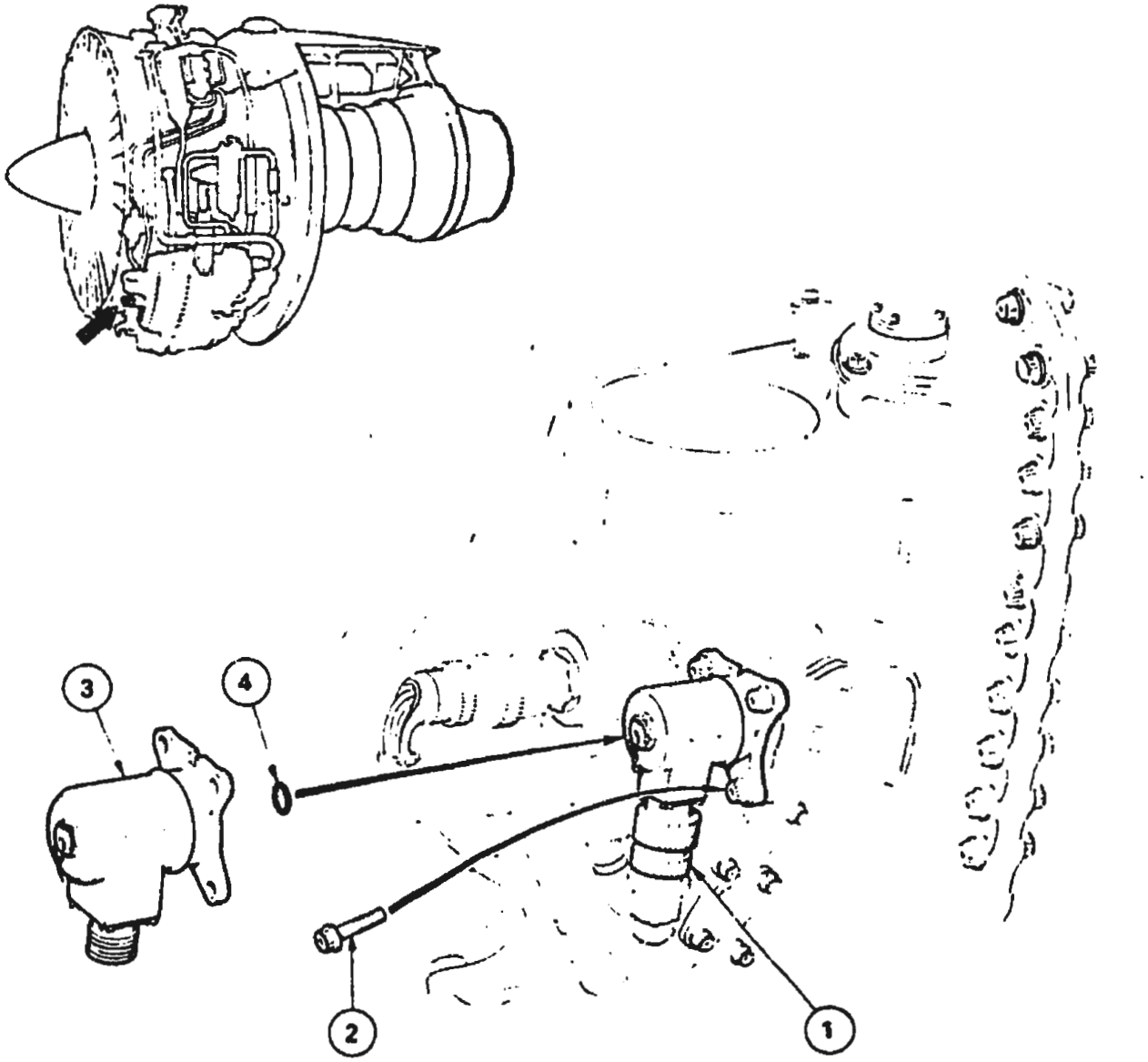
(7) Secure switch with mount bolts.

(8) Connect and secure electrical connector.

(9) Remove tags and close circuit breakers opened in Step 3A(1).

(10) Perform operational test of oil pressure indicating and warning systems (Ref. 79-31-00).

(11) Close cowl opened in Step 3A(2).



1. Electrical connector
2. Securing bolt (4 off)
3. Low oil pressure warning switch
4. Seal ring (2 off)

HA 1214
M1-0100-79-406
25792

Oil Low-pressure Warning Switch - Removal and Installation
Figure 401

OIL PRESSURE INDICATOR - REMOVAL AND INSTALLATION

1. Referenced Procedure

   79-31-04 Oil Pressure Indicator - Adjustment/Test

2. Removal/Installation

   A. Removal

      (1) On Flight Engineer/Second Officers aft circuit breaker panel CB3, zone 215, open and tag circuit breaker OIL PRESS (R10).

      On Flight Engineer/Second Officers overhead circuit breaker panel CB2, zone 215, open and tag circuit breaker FLIGHT STATION LIGHTS - F/E INSTR (E9).

      (2) Locate applicable oil PRESS indicator on ENGINE OIL panel on Flight Engineer/Second Officers lower panel (Ref. Fig. 401).

      (3) Loosen clamp screw at panel cutout next to indicator. Withdraw indicator from panel to gain access to electrical connector.

      (4) Disconnect harness connector from indicator receptacle connector. Tape and stow harness connector.

   B. Installation

      (1) Verify that circuit breakers opened in Step A(1) are open and tagged.

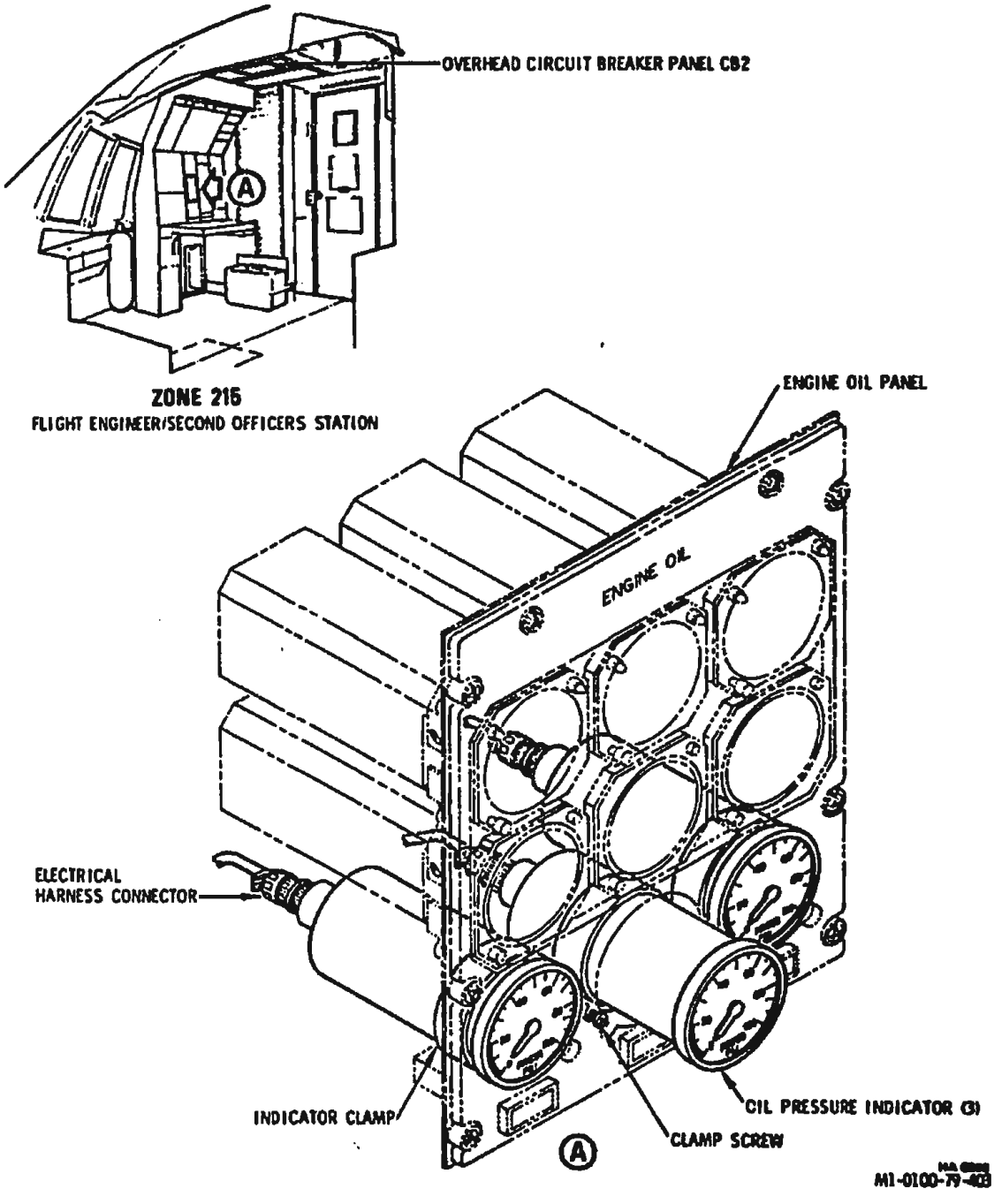
      (2) Connect harness connector to indicator receptacle connector.

      (3) Slide indicator into ENGINE OIL panel cutout.

      (4) Verify that indicator is correctly oriented with 50-pound PSI mark on scale at 12 o'clock position. Tighten clamp screw. Torque clamp screws 5 to 8 lb in.

      (5) Remove tags and close circuit breakers opened in Step A(1).

      (6) Perform indicator BITE test (Ref. 79-31-04, Adjustment/Test).



Oil Pressure Indicator - Removal and Installation
Figure 401

OIL PRESSURE INDICATOR - ADJUSTMENT AND TEST

1. Referenced Procedure

   24-41-00 External Power/Ground Service System - Maintenance Practices

2. Adjustment/Test

   A. BITE Test

      (1) Turn on electrical power (Ref. 24-41-00).

      (2) On Flight Engineer/Second Officers aft circuit breaker panel CB3, zone 215, verify that circuit breaker OIL PRESS (R10) is closed.

      (3) On Flight Engineer/Second Officers lower panel, zone 215, locate applicable oil pressure indicator and the TEST PRESS IND switch.

      (4) Depress test switch and verify that oil pressure indicator pointers are driven to the 9 o'clock position.

      (5) Release test switch and verify that pointers return to 0.

      (6) Turn off electrical power (Ref. 24-41-00).

FINE SCAVENGE OIL FILTER PRESSURE DIFFERENTIAL SWITCH REMOVAL AND INSTALLATION

1. Equipment and Materials

R Clean receptacle - Minimum Capacity:

10.0 US pints

8.0 Imperial pints

5.0 Liters

Stiff-bristle brush

Protective caps

R Seal rings

R 2. Referenced Procedures

12-12-01	Engine Oil Replenishing
70-02-01	Identification, Lubrication, and Fitting of Rubber Sealing Rings - Maintenance Practices
71-11-00	Engines No. 1 and No. 3 Cowling - Servicing
71-12-01	LH and RHnd RH Lower Hinged Cowls-Servicing
79-31-00	Oil Pressure Indicating and Warning System - Adjustment and Test

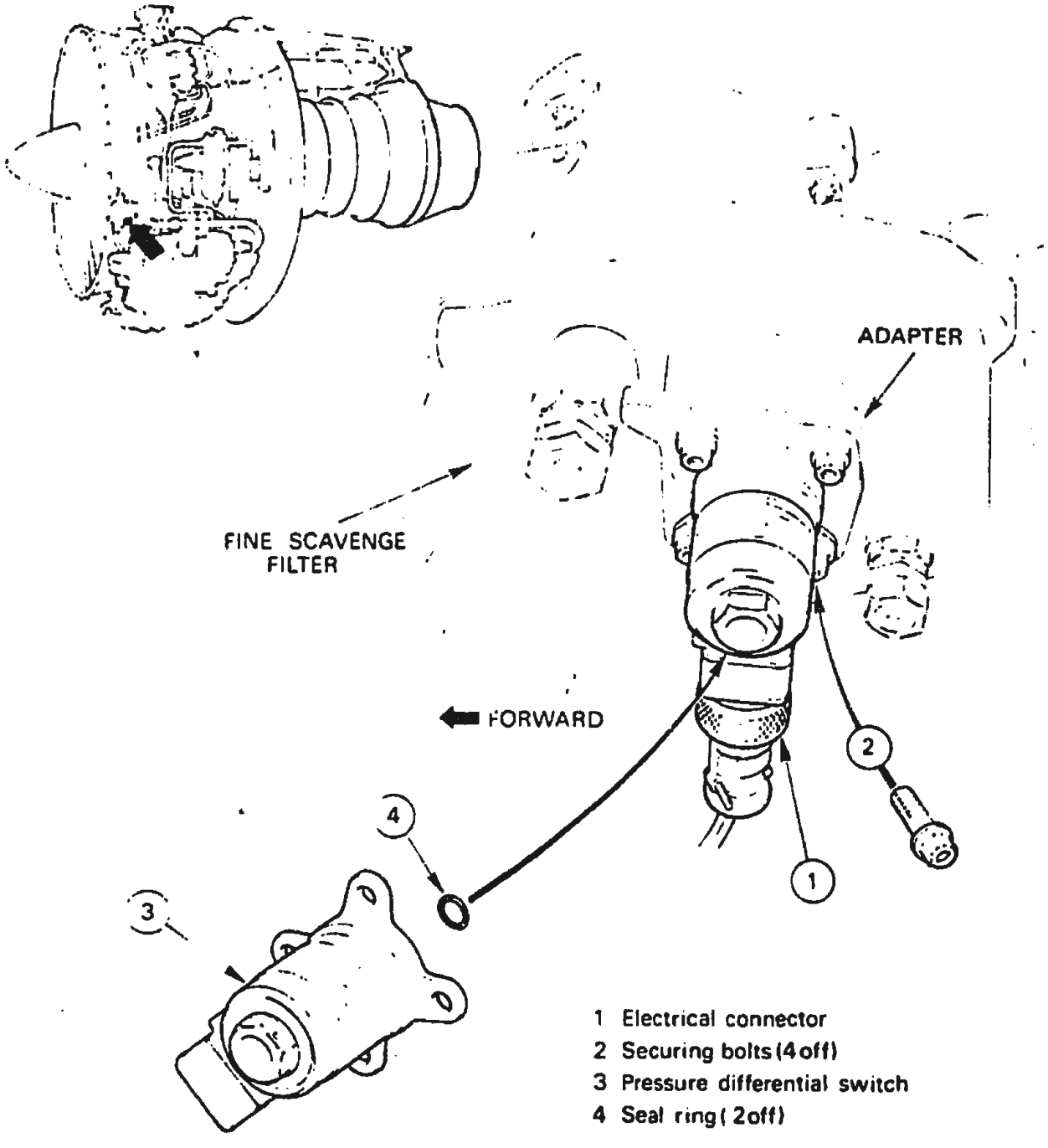
3. Removal/Installation

A. Removal

(1) On Flight Engineer/Second Officers aft circuit breaker panel CB3, zone 215, open and tag applicable circuit breakers OIL PRESSURE (R10) and applicable OIL LOW PRESS LIGHT (N5, N11, or N17).

(2) Open LH hinged cowl 413A or 423A for engines No. 1 or 3 (Ref. 71-11-00) or 433AL for engine No. 2 (Ref. 71-12-01).

(3) Disconnect electrical connector from pressure differential switch plug (Ref. Fig. 401).



1 Electrical connector
2 Securing bolts (4 off)
3 Pressure differential switch
4 Seal ring (2 off)

M1-0100-79-409
30304

Fine Scavenge Filter Pressure Differential Switch - Removal and Installation
Figure 401

R WARNING: THE SYNTHETIC LUBRICATING OIL USED IN THIS ENGINE
R MAY CAUSE IRRITATION, IF SKIN CONTACT IS REPEATED
R OR PROLONGED.

IMMEDIATELY AFTER SHUT DOWN ENGINE OIL TEMPERATURE REMAINS HIGH THEREFORE, EXTREME CARE MUST BE OBSERVED WHEN WORKING NEAR TO OR ON ENGINE OIL SYSTEM COMPONENTS AND TUBES.

CAUTION: THE OIL SPECIFIED FOR USE IN THIS OIL SYSTEM IS INJURIOUS TO PAINTWORK AND CERTAIN TYPES OF RUBBER AND MUST NOT BE ALLOWED TO CONTAMINATE THOSE PARTS OF THE ENGINE NOT NORMALLY IN CONTACT WITH IT. ANY OIL SPILLED DURING SERVICING MUST BE WIPED UP IMMEDIATELY.

(4) Remove oil filter pressure differential switch securing bolts.

(5) Lift pressure differential switch from filter mounting face to clear dowl, then remove switch.

(6) Remove and discard seal rings from oil port recesses in filter. Install protective caps on all ports.

B. Installation

(1) Verify that circuit breakers opened in Step 3A(1) are open and tagged.

(2) Remove protective caps from oil ports on pressure switch and oil pressure filter.

WARNING: AVOID SKIN CONTACT AND INHALING THE VAPOR WHEN USING DEGREASING FLUID.

(3) Moisten cloth with degreasing fluid and remove all traces of oil jointing compound from oil filter front face and switch mounting face.

CAUTION: DO NOT ALLOW JOINTING COMPOUND TO ENTER OIL PASSAGES.

(4) Using stiff-bristled brush, apply thin film of jointing compound to mating faces of oil filter and switch. Compound must be allowed to air-dry for at least 10 minutes.

(5) Lubricate seal rings (Ref. 70-02-01) and install in the oil port recesses in the switch mounting face of the oil filter. Verify that retaining ring for each seal is not displaced.

(6) Position pressure differential switch on filter mounting face, ensuring correct location by alignment with dowel.

(7) Secure switch with bolts.

(8) Remove protective caps and connect electrical components.

(9) Remove tags and close circuit breakers opened in Step 3A(1).

(10) Perform operational test of oil pressure indicating and warning system (Ref. 79-31-00).

(11) Replenish engine oil (Ref. 12-12-01).

(12) Close cowl opened in Step 3A(2).

OIL TEMPERATURE INDICATING SYSTEM - DESCRIPTION AND OPERATION

1. General

The oil temperature indicating system (Ref. Fig. 1) provides a remote, visual indication of the main feed oil temperature. The indicators, one for each engine, are located at the Flight Engineer/Second Officers station, zone 215. The indicators are mounted in the ENGINE OIL panel (Ref. 79-30-00, Fig. 1).

The engine-mounted sending unit consists of a temperature bulb installed in the outlet port of the oil pressure filter (Ref. Fig. 2). The filter is located on the front face of the oil tank.

The temperature bulb of each engine is connected, through the engine electrical harness (Ref. 71-50-00) and the aircraft wiring, to one of three oil temperature indicators.

2. Oil Temperature Bulb

A. Description and Operation

The oil temperature bulb, zones 412, 422 and 432, consists of a closed tube housing a spiral of nickel wire, of known electrical resistance, that is connected to an electrical receptacle on the bulb.

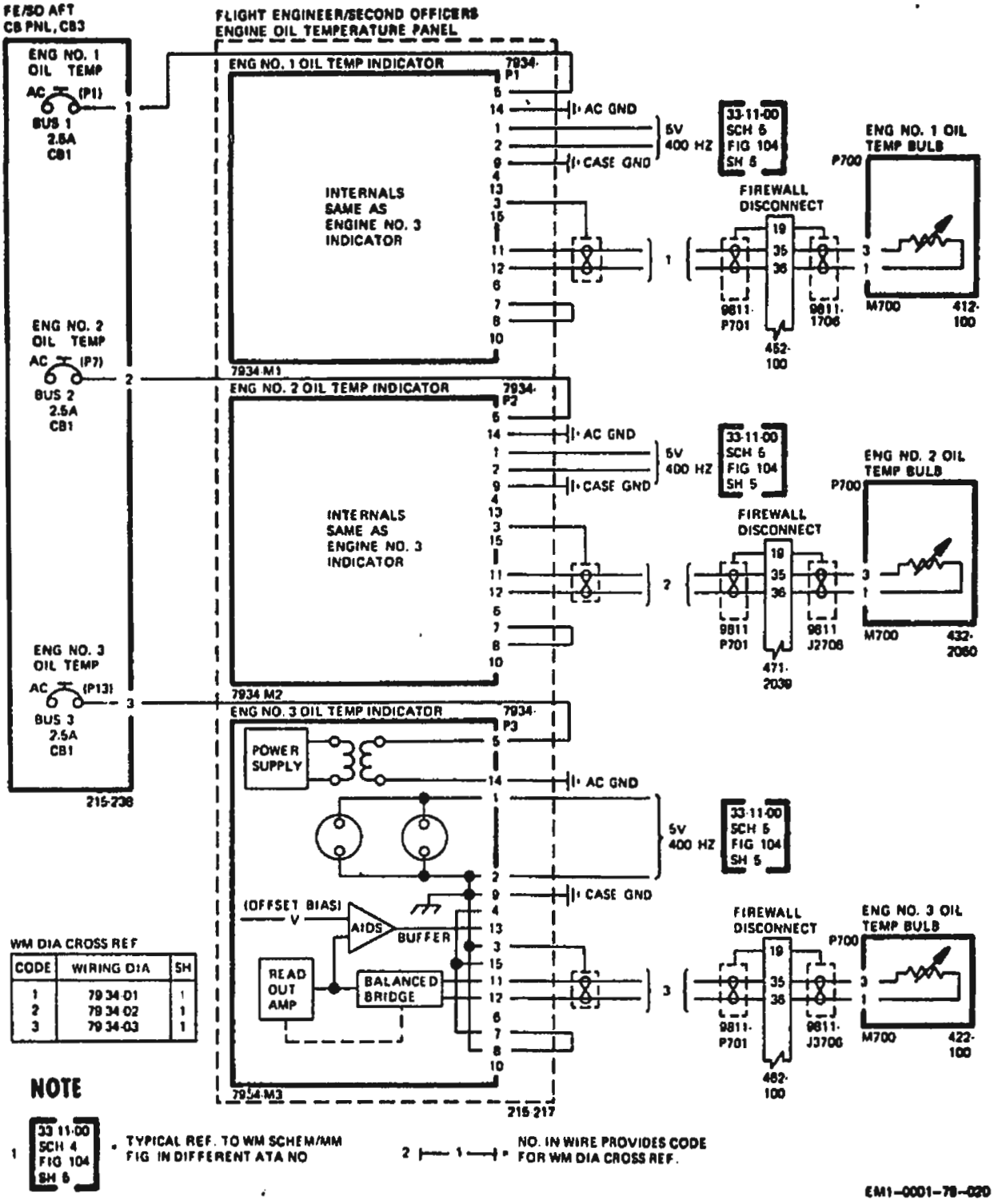
The bulb is positioned in the pressure filter outlet so that feed oil flows around the tube (Ref. Fig. 2).

Variations in oil temperature cause variations in resistance of the wire proportional to the temperature change. As the wire forms one arm of a bridge in the indicating circuit, the change in resistance disturbs the balance and causes the indicator pointer to deflect and so indicate the oil temperature.

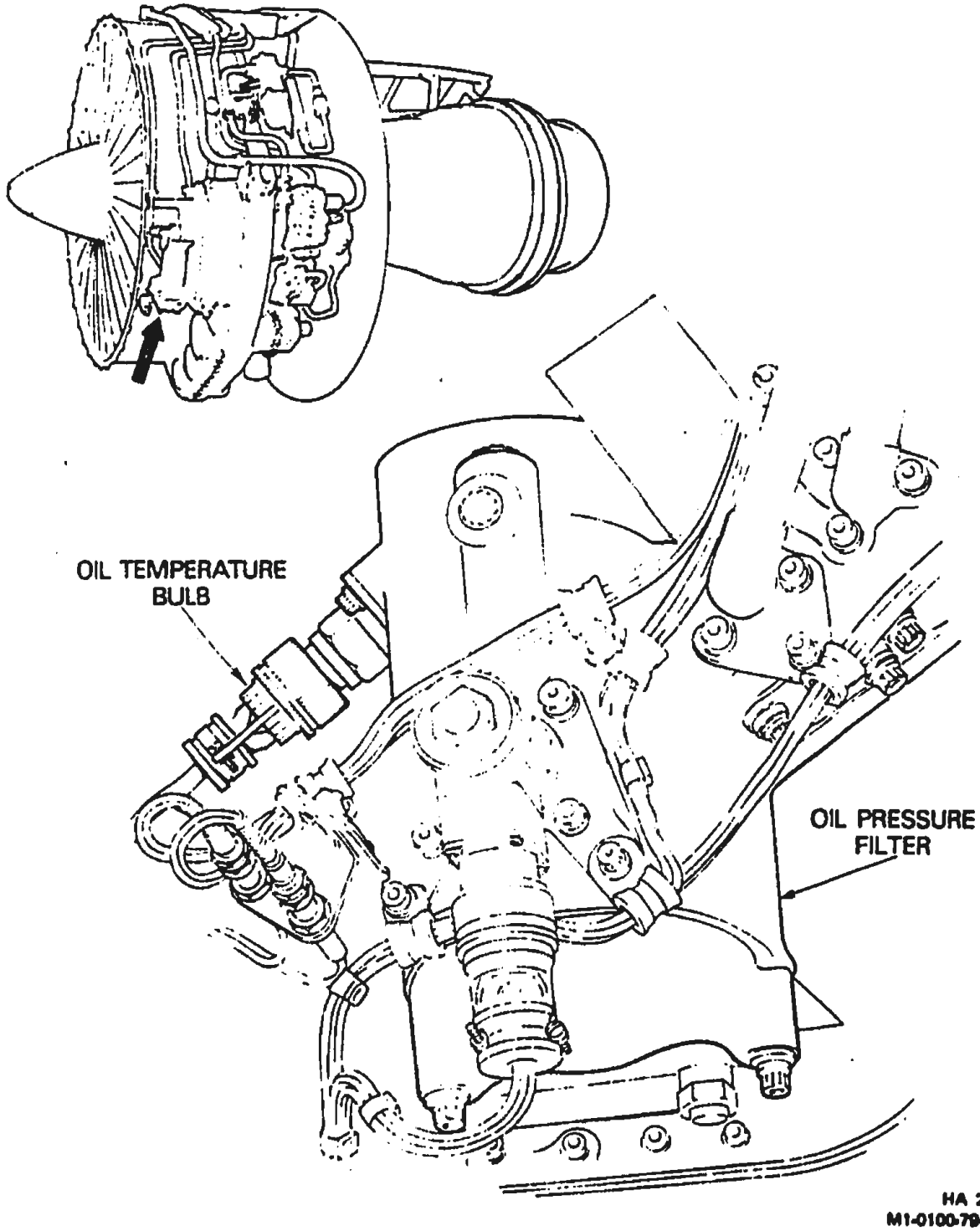
3. Oil Temperature Indicator

A. Description

Three oil temperature indicators, located on the Flight Engineer/Second Officers ENGINE OIL panel, zone 215, provide an analog (pointer) display of engine oil temperature. Each indicator (Ref. Fig. 3) is housed in a standard No. 2 ATI case. The round scale plate (dial) is graduated to indicate temperatures ranging from -50 to +150 degrees centigrade.



R Oil Temperature Indicating System Schematic
R Figure 1



Oil Temperature Bulb
Figure 2

There is a yellow range arc (caution) extending from 90 to 135 degrees with a red radial at 135 degrees centigrade.

A built-in-test-equipment (BITE) actuator is located in the front lower left corner of the indicator. Quickly replaceable front-mounted lights, combine with wedge-type viewing glass to illuminate the dial.

Electronics for conditioning the input signal and driving the pointer display are located in the rear of the indicator case. The pointer is positioned by a dc torquer in the front (dial end) of the case. The torquer contains a followup potentiometer with the brush directly connected to the pointer shaft.

B. Operation

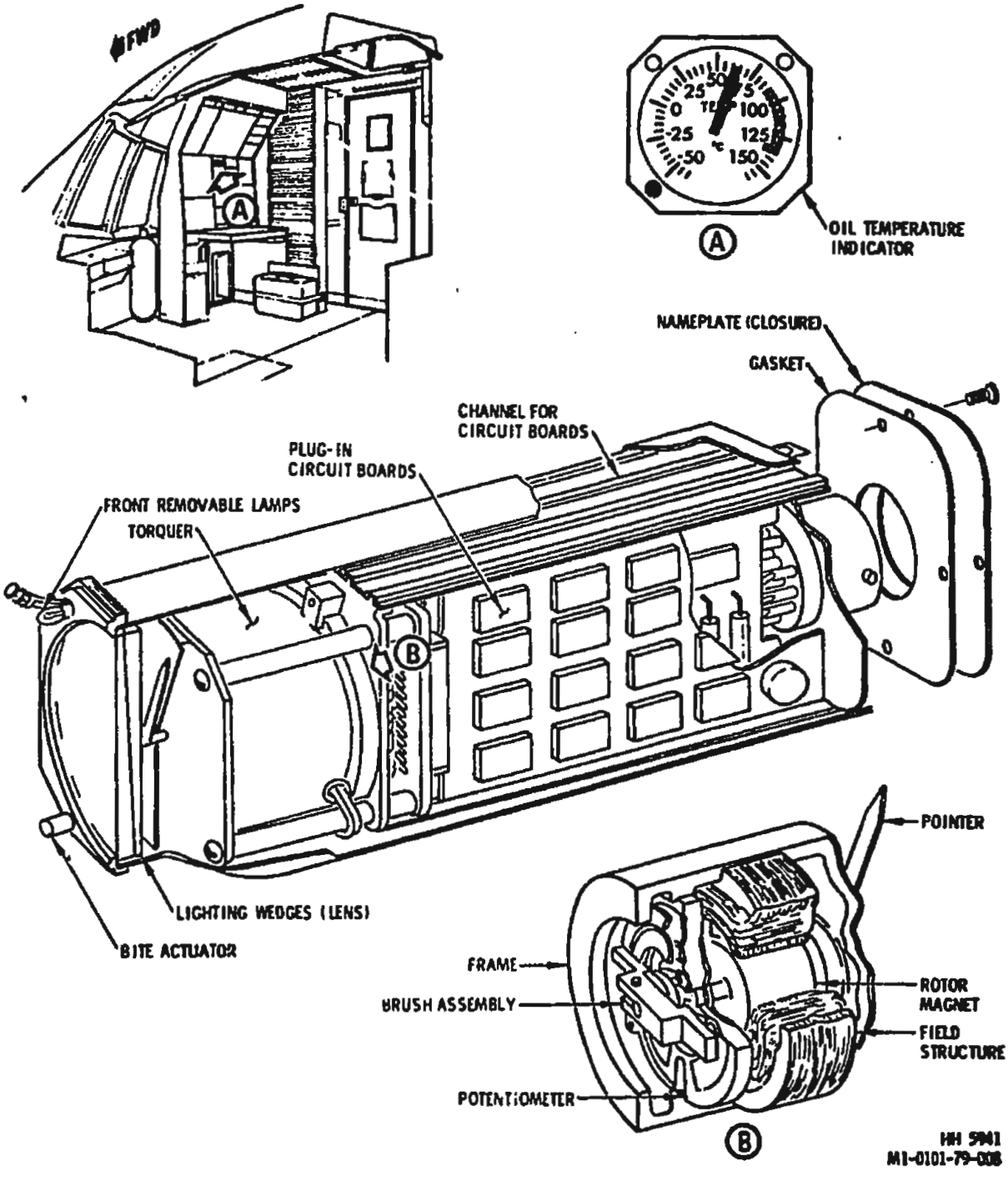
Operation of the indicator requires 115V, 400-Hz power. The lighting operates on 5V, 400-Hz power.

The indicator input circuit consists of three legs of a resistance bridge circuit. One of these is the followup potentiometer. The fourth leg of the bridge is the resistance temperature detector (RTD) which is submerged in oil. A change in oil temperature causes a change in RTD resistance that unbalances the bridge circuit and provides a voltage output. The output is a function of oil temperature.

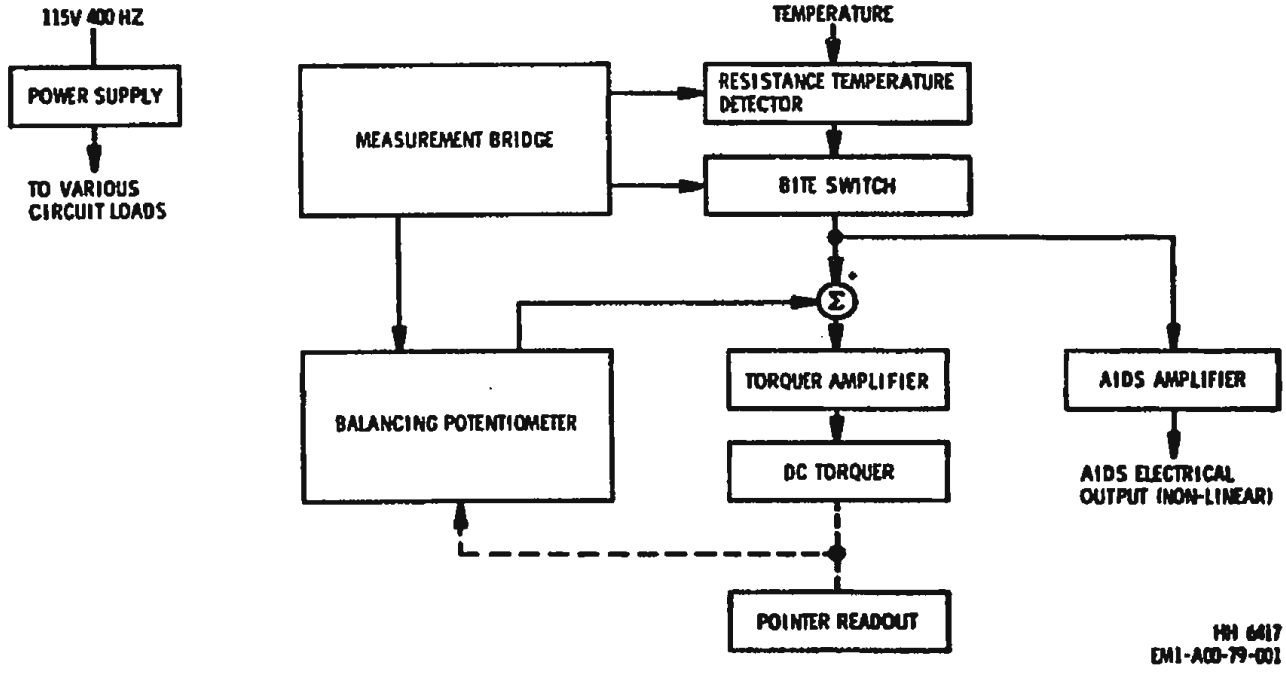
The bridge output voltage is compared to the output of the followup potentiometer (Ref. Fig. 4). The differential voltage is amplified to provide the driving signal for the torquer. Rotation of the torquer and potentiometer brush is in a direction to make the potentiometer output voltage equal the bridge output. When these voltages are equal, torque loading is zero. The torquer and attached pointer come to rest at a position which represents the oil temperature.

When the BITE switch is actuated, a predetermined signal replaces the sensor signal. This signal causes the pointer to indicate approximately +70 degrees C on the indicator scale.

R Provision is made in the indicator for connection to the aircraft integrated data system (AIDS) recorder.



Oil Temperature Indicator
Figure 3



Oil Temperature Indicator Block Diagram
Figure 4

OIL TEMPERATURE BULB - REMOVAL AND INSTALLATION

1. Equipment and Materials

   Clean receptacle - minimum capacity 2 U.S. pints

   Protective caps

   Gasket (Ref. Fig. 401)

   Lock-wire, Fed Spec QQ-W-390, 0.032-inch diameter, or equivalent

2. Referenced Procedures

   71-11-00 Engines No. 1 and 3 Cowling - Servicing

   71-12-01 LH and RH Lower Hinged Cowl - Servicing

3. Removal/Installation

   A. Removal

      (1) On Flight Engineer/Second Officers aft circuit breaker panel, CB3, zone 215, open and tag applicable circuit breaker OIL TEMP (P1, P7, or P13).

      (2) Open applicable LH hinged cowl for engines No. 1 or 3 (Ref. 71-11-00) or LH lower hinged cowl for engine No. 2 (Ref. 71-12-01).

      CAUTION: ENSURE ELECTRICAL CONNECTOR IS FREE OF LIQUID AND/OR SOLID CONTAMINATION BEFORE DISCONNECTING.

      (3) Disconnect electrical connector from oil temperature bulb (Ref. Fig. 401) and install protective caps.

      WARNING: THE SYNTHETIC LUBRICATING OIL USED IN THIS ENGINE
      R MAY CAUSE IRRITATION, IF SKIN CONTACT IS REPEATED
      R OR PROLONGED.

      IMMEDIATELY AFTER SHUT DOWN ENGINE OIL TEMPERATURE REMAINS HIGH, THEREFORE, EXTREME CARE MUST BE OBSERVED WHEN WORKING NEAR TO OR ON ENGINE OIL SYSTEM COMPONENTS AND TUBES.

R CAUTION: PREVENT LUBRICATING OIL USED IN ENGINE OIL SYSTEM
R FROM COMING INTO CONTACT WITH PAINT AND CERTAIN
R TYPES OF RUBBER NOT NORMALLY USED IN ENGINE
R APPLICATIONS. DRAINED OIL MUST NOT BE REUSED IN
R THE ENGINE.

(4) Remove temperature bulb, remove and discard gasket.

(5) Install protective cap on temperature bulb port.

B. Installation

(1) Verify that circuit breaker opened in Step 3A(1) is open and tagged.

(2) Remove protective caps from temperature bulb port and electrical connector (Ref. Fig. 401).

(3) Install new gasket on temperature bulb.

(4) Verify that mounting face on oil pressure filter is clean and free from damage.

(5) Install temperature bulb and lock-wire.

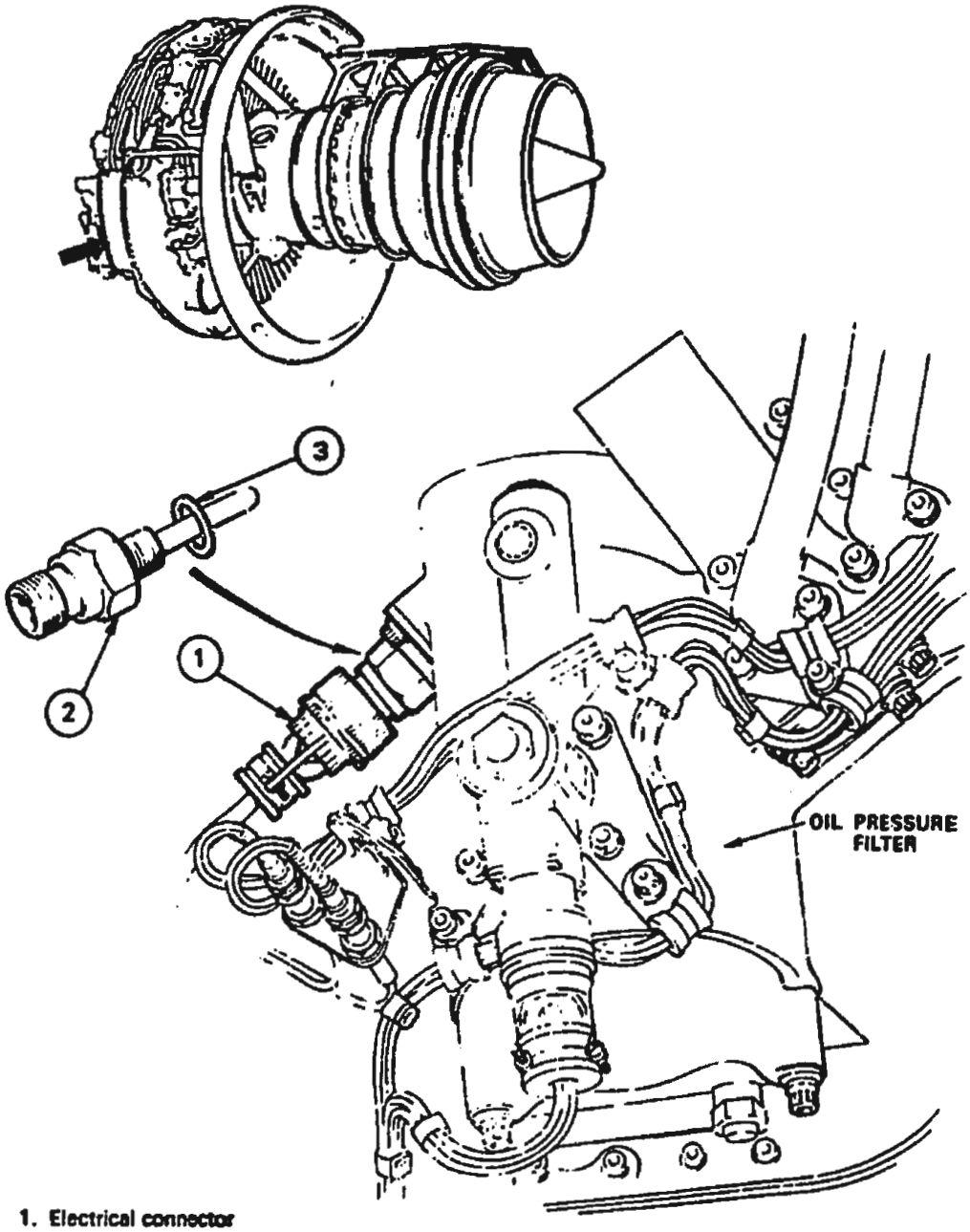
R CAUTION: ENSURE ELECTRICAL CONNECTOR IS FREE OF LIQUID AND/OR SOLID CONTAMINATION BEFORE CONNECTING.

(6) Connect electrical connector.

(7) Remove tags and close circuit breakers opened in Step 3A(1).

(8) Close cowl (Ref. 71-11-00 or 71-12-01).

(9) During next engine run, verify that temperature indications meet requirement.



1. Electrical connector
2. Temperature bulb
3. Gasket

HA 1215
M1-0100-79-407
25943

Oil Temperature Bulb - Removal and Installation
Figure 401

OIL TEMPERATURE INDICATOR - REMOVAL AND INSTALLATION

1. Referenced Procedure

   79-34-02 Oil Temperature Indicator - Adjustment/Test

2. Removal/Installation

   A. Removal

      (1) On Flight Engineer/Second Officers aft circuit breaker panel CB3, zone 215, open and tag applicable circuit breaker OIL TEMP (P1, P7, or P13).

      On Flight Engineer/Second Officers overhead circuit breaker panel CB2, zone 215, open and tag circuit breaker FLIGHT STATION LIGHTS - F/E INSTR (E9).

      (2) Locate applicable oil TEMP indicator on ENGINE OIL panel on Flight Engineer/Second Officers lower panel (Ref. Fig. 401).

      (3) Loosen clamp screw next to applicable indicator. Withdraw indicator from panel to gain access to electrical connector.

      (4) Disconnect harness connector from indicator receptacle connector. Tape and stow harness connector.

   B. Installation

      (1) Verify that circuit breakers opened in Step A(1) are open and tagged.

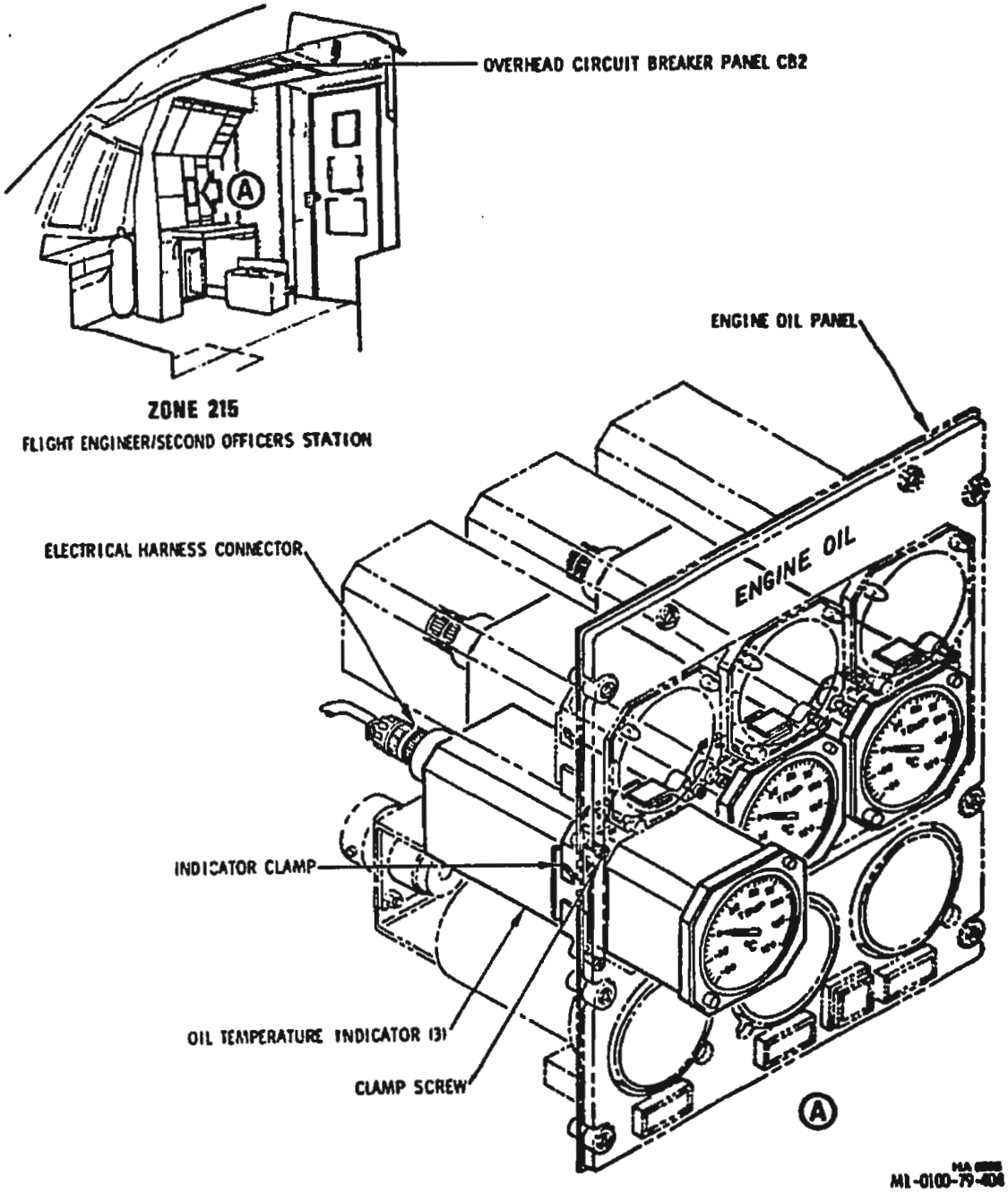
      (2) Connect harness connector to indicator receptacle connector.

      (3) Slide indicator into edge-lighted ENGINE OIL panel cutout.

      (4) Secure indicator in retaining clamp by tightening clamp screw. Torque clamp screws 5 to 8 lb in.

      (5) Remove tags and close circuit breakers opened in Step A(1).

      (6) Perform indicator BITE test (Ref. 79-34-02, Adjustment/Test).



Oil Temperature Indicator - Removal and Installation
Figure 401

OIL TEMPERATURE INDICATOR - ADJUSTMENT AND TEST

1. Referenced Procedure

   24-41-00 External Power/Ground Service System - Maintenance Practices

2. Adjustment/Test

   A. BITE Test

      (1) Turn on electrical power (Ref. 24-41-00).

      (2) On Flight Engineer/Second Officers aft circuit breaker panel CB3, zone 215, verify that applicable circuit breaker OIL TEMP (P1, P7, or P13) is closed.

      (3) On Flight Engineer/Second Officers lower panel, zone 215, locate applicable oil temperature indicator and the built-in test equipment (BITE) switch in the lower left corner of the indicator.

      (4) Observe temperature of applicable engine oil.

      (5) Depress BITE switch and verify that indicator pointer is driven to 12 o'clock position.

      (6) Release BITE switch and verify that pointer returns to previously observed temperature.

      (7) Turn off electrical power (Ref. 24-41-00).

OIL QUANTITY INDICATING SYSTEM - DESCRIPTION AND OPERATION

1. General

The engine oil quantity indicating system consists of three oil quantity transmitters and three round-dial indicators. The indicators, which provide an analog indication of the oil level in the engine oil tanks, are located along the top row of the Flight Engineer/Second Officers ENGINE OIL panel, zone 215. One transmitter is mounted in each engine oil tank, zones 412, 422 and 432, and is connected through the engine electrical harness (Ref. 71-50-00) and aircraft wiring to the applicable oil quantity indicator .

The transmitter functions as a potentiometer and, when energized with a reference voltage, provides an electrical signal proportional to oil level (Ref. Fig. 1 and 2).

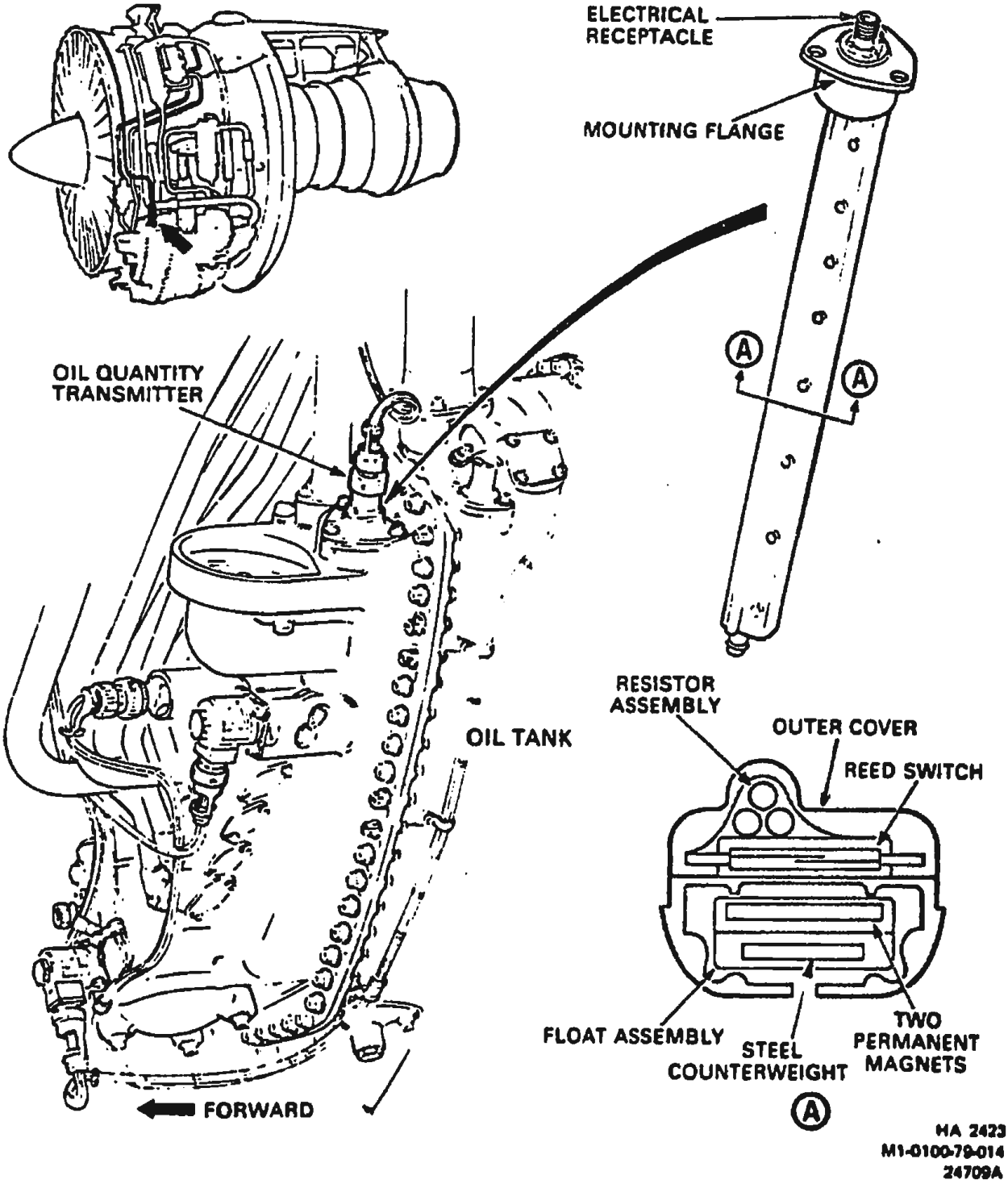
2. Oil Quantity Transmitter

A. Description and Operation

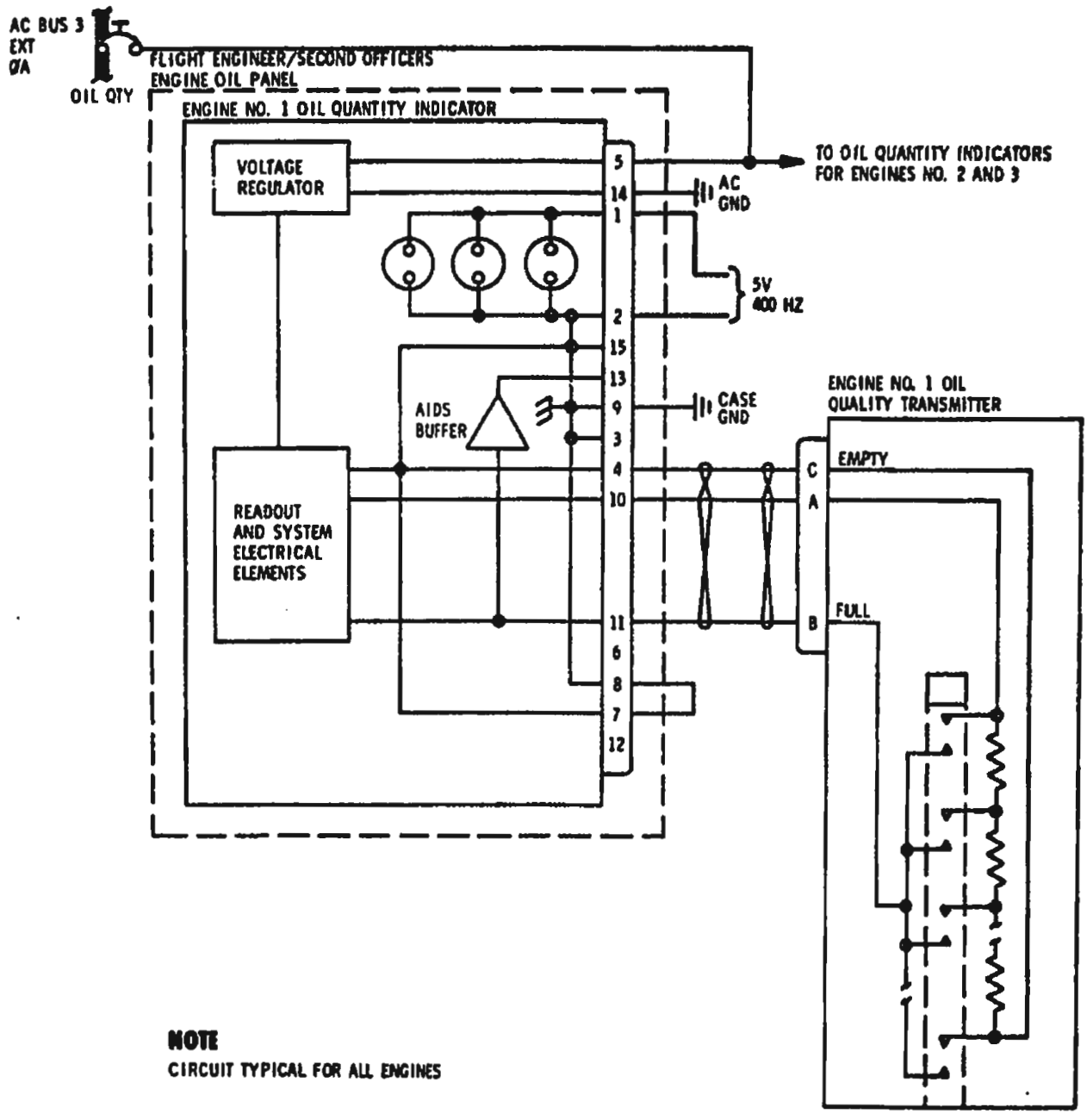
The transmitter (Ref. Fig. 1 and 2), located in zones 412, 422 and 432, basically comprises a metal tube containing a float assembly and a multi-switch and resistor assembly.
R The metal tube incorporates a series of holes which allow
R oil access to the float.

The float assembly consists of two permanent magnets and a counterweight in a sealed chamber. The position of the float assembly within the metal tube is dependent on the oil level in the tank. The multi-switch and resistor assembly includes a ladder of switches interconnected by a resistor. Each switch consists of two magnetically activated, flat metal reeds that are hermetically sealed in a glass tube. The reeds are of equal length, overlapping at the center, where they are separated by a small gap, forming a normally open switch. The action of a switch closing, and the position of that switch in the ladder, varies the resistance of the circuit through the multi-switch assembly.

With the oil tank full and, therefore, the float assembly at the upper extent of its travel, the magnetic field induced by the magnets in the float assembly acts on the top two switches in the ladder and causes them to close. In this configuration the electrical resistance in the circuit is at its minimum, therefore providing maximum output signal from the transmitter.



Oil Quantity Transmitter
Figure 1



NOTE
CIRCUIT TYPICAL FOR ALL ENGINES

M1-0001-79-009

R
R Oil Quantity Indicating System Schematic
Figure 2

As oil level and, therefore, the float falls, the magnetic field is removed from the top switches, which re-open. The level is sensed by the next two switches, which close. This increases the electrical resistance in the circuit and reduces the transmitter output signal to the indicator system.

The output signal from the transmitter is fed to the indicator system where it is processed and displayed as an oil quantity measurement.

3. Oil Quantity Indicator

A. Description

The oil quantity indicator provides an analog (pointer) display of the level of engine oil in the high-speed external gearbox of an engine (Ref. Fig. 3).

R The indicator is housed in a standard No. 2 ATI case. The scale plate (dial) is graduated to indicate0 to 21 quarts of oil. A built-in-test-equipment (BITE) actuator is located in the lower left front corner of the indicator. Front-mounted, quickly replaceable lamps and a wedge-type viewing glass are used to illuminate the dial.

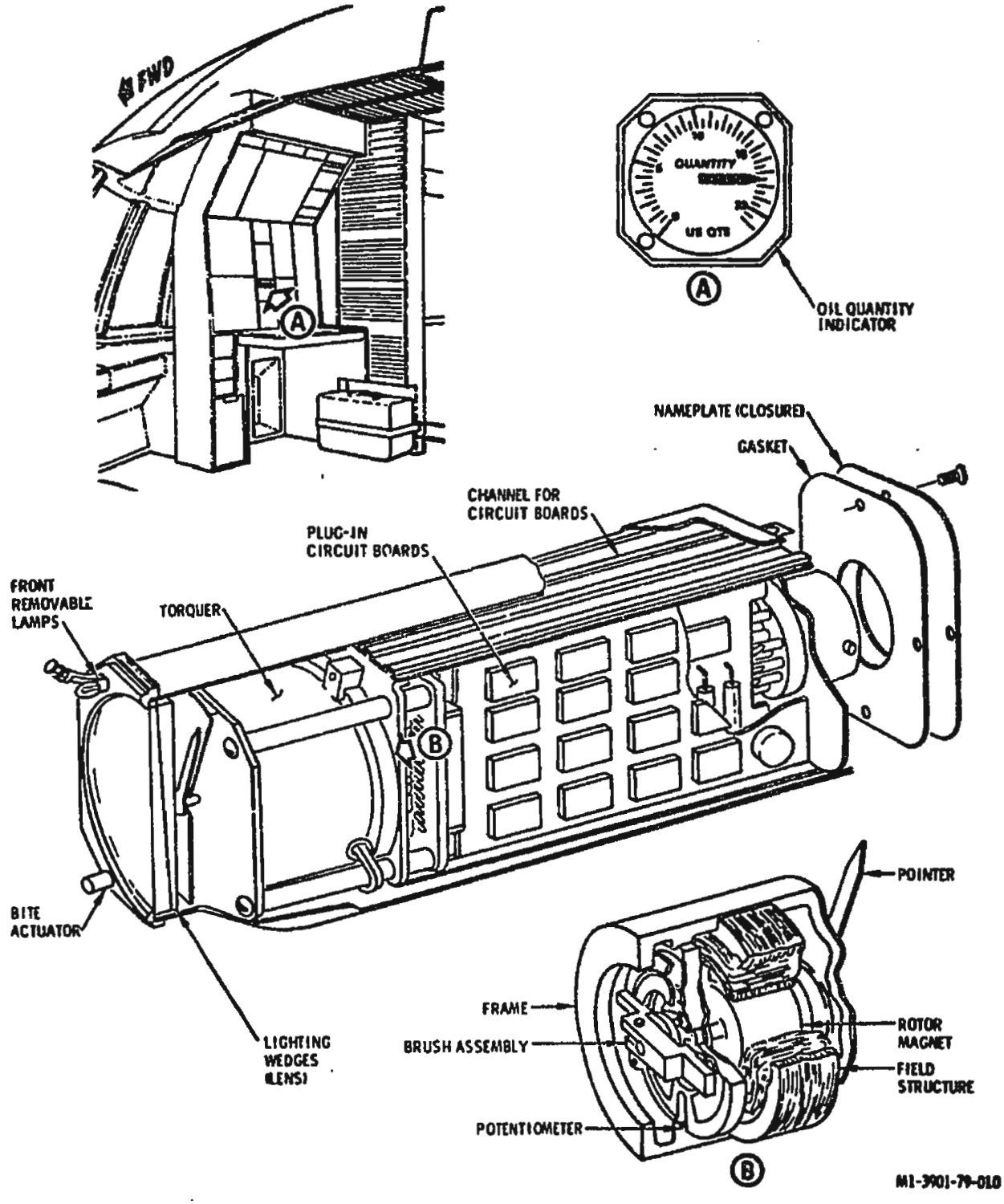
Electronic components to condition the input signal and to drive the pointer display are located in the rear of the indicator case. The pointer is positioned by a dc torquer in the front of the case. The torquer contains a followup potentiometer with the brush directly connected to the pointer shaft.

B. Operation

The indicator requires 115V, 400-Hz operating power. The indicator lighting operates on 5V, 400-Hz power.

The indicator furnishes a reference voltage to the oil quantity transmitter at the engine. A portion of the voltage, which is dependent on the quantity of oil in the high-speed external gearbox, is returned to the indicator as a signal. The dc torquer is actuated by a voltage signal which is the difference between the followup potentiometer output and the transmitter signal voltage (Ref. Fig. 4).

The output voltage of the followup potentiometer is compared to the transmitter signal voltage and the difference is amplified to drive the torquer. The torque produced rotates the potentiometer brush in the direction to make the potentiometer output voltage equal the signal voltage. When

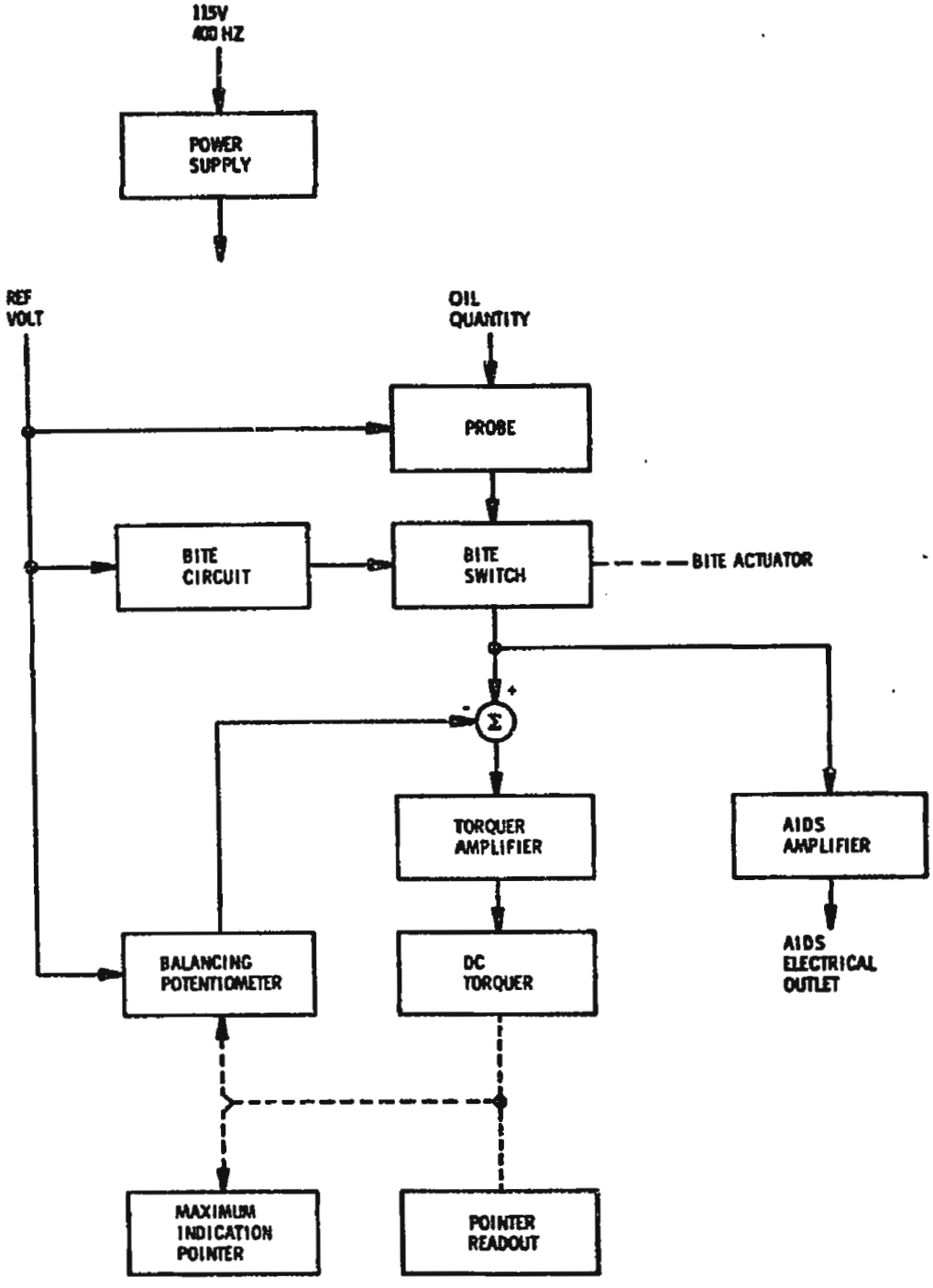


R
R

Oil Quantity Indicator
Figure 3

EFFECTIVITY: ALL

001B



Oil Quantity Indicator Block Diagram
Figure 4

these two voltages are equal, the torque loading is zero and the torquer and attached pointer come to rest at a position which represents the oil quantity.

When the BITE switch is actuated, a predetermined voltage replaces the transmitter signal voltage. The predetermined voltage drives the pointer to the 12 o'clock position on the indicator scale.

OIL QUANTITY INDICATING SYSTEM - MAINTENANCE PRACTICES

1. Deactivation

R NOTE: This deactivation procedure applies only when an aircraft
R is to be dispatched in accordance with the MEL.

If the engine is to be operated with an inoperative oil quantity indicating system, verify the tank quantity as adequate (Ref. 12-12-01).

OIL QUANTITY TRANSMITTER - REMOVAL AND INSTALLATION

1. Equipment and Materials

Protective Caps

Stiff-bristle brush

Jointing Compound, British Spec DTD.900/4586 (Hylomar light), or equivalent

Degreasing Fluid, British Spec B.S. 4487:1969 (Chlorothene NU, Inhibisol, or Genklene), or equivalent

R Seal ring, PN AS12801-134(VU1653), or equivalent

R O-ring seal, PN 2-01277-545(V83259) (WITHOUT RR SB79-4475), or
R equivalent

R O-ring seal, PN 2-110V747-75(V83259) (WITH RR SB79-4475), or
R equivalent

2. Referenced Procedures

70-02-01	Rubber Sealing Rings, Identification, Lubrication and Fitting
71-11-00	Engines No. 1 and 3 Cowling - Servicing
71-12-01	LH and RH Lower Hinged Cowl - Servicing

3. Removal/Installation

C WARNING: DO NOT ALLOW SYNTHETIC LUBRICATING OIL USED IN THIS
C ENGINE TO COME INTO PROLONGED CONTACT WITH SKIN. OIL
C CAN BE TOXIC THROUGH ABSORPTION.

C CAUTION: PREVENT LUBRICATING OIL USED IN ENGINE OIL SYSTEM FROM
C COMING INTO CONTACT WITH PAINT AND CERTAIN TYPES OF
C RUBBER NOT NORMALLY USED IN ENGINE APPLICATIONS.
C DRAINED OIL MUST NOT BE REUSED IN THE ENGINE.

C NOTE: Pending modification of the oil system to correct oil
C migration, the following procedure should be observed:
C If log remark indicates oil quantity did not drop below 5
C quarts and did return to normal in cruise, then no
C corrective action will be required. Sign off log book

C referencing this note (by manual chapter/section/subject
C page number).

A. Removal

(1) On Flight Engineer/Second Officers aft circuit breaker panel, zone 215, open and tag circuit breaker OIL QTY (R14).

(2) Open applicable LH hinged cowl for engines No. 1 or 3 (Ref. 71-11-00) or LH lower hinged cowl for engine No. 2 (Ref. 71-12-01).

(3) Disconnect electrical connector from oil quantity transmitter (Ref. Fig. 401) and install protective caps.

R WARNING: THE SYNTHETIC LUBRICATING OIL USED IN THIS ENGINE
R MAY CAUSE IRRITATION IF SKIN CONTACT IS REPEATED
R OR PROLONGED.

IMMEDIATELY AFTER SHUT DOWN ENGINE OIL TEMPERATURE REMAINS HIGH, THEREFORE, EXTREME CARE MUST BE OBSERVED WHEN WORKING NEAR TO OR ON ENGINE OIL SYSTEM COMPONENTS AND TUBES.

CAUTION: PREVENT LUBRICATING OIL USED IN ENGINE OIL SYSTEM FROM COMING INTO CONTACT WITH PAINT AND CERTAIN TYPES OF RUBBER NOT NORMALLY USED IN ENGINE APPLICATIONS. DRAINED OIL MUST NOT BE REUSED IN THE ENGINE.

(4) Remove oil quantity transmitter, remove and discard seal ring and O-ring seal(s).

(5) Install protective cap on transmitter port.

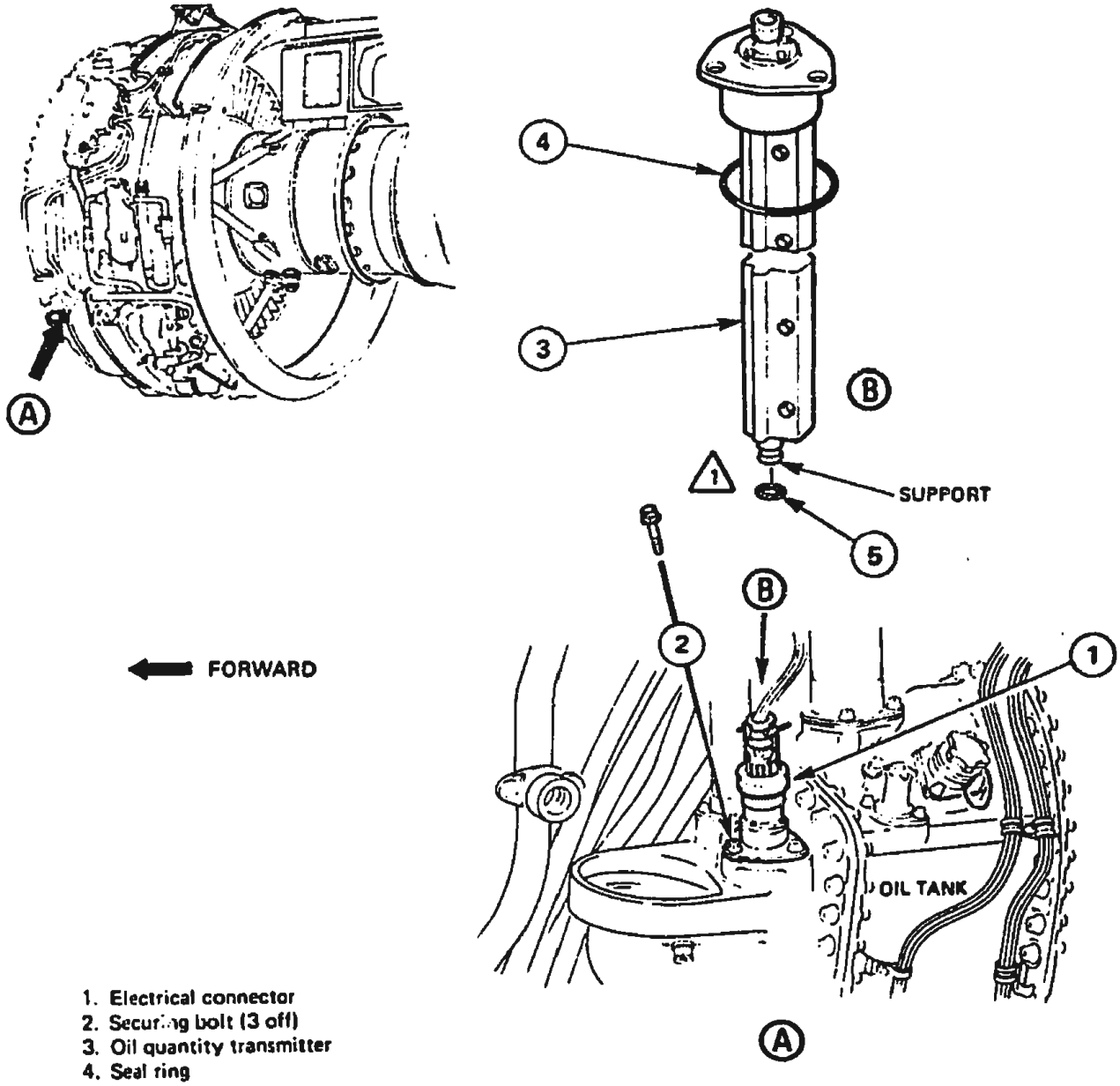
B. Installation

(1) Verify that circuit breaker opened in Step 3A(1) is open and tagged.

(2) Remove protective cap from oil quantity transmitter port. Remove plastic tube that holds transmitter float assembly stationary during transportation and storage.

(3) Before installing transmitter, check indication system as follows:

(a) Remove protective caps and connect electrical connector to transmitter.



1. Electrical connector
2. Securing bolt (3 off)
3. Oil quantity transmitter
4. Seal ring
5. O-ring seal

1 NOTE:
ON ENGINES WITH RR SB 79-4475,
TWO O-RING SEALS ARE INSTALLED.

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R Oil Quantity Transmitter - Removal and Installation
R Figure 401

R (b) Remove tags and close circuit breaker opened in
R Step 3A(1).

R (c) Hold transmitter upside down and verify cockpit
R oil quantity indicator reads full.

R (d) Hold transmitter upright and verify cockpit oil
R quantity indicator reads zero.

R (e) Disconnect electrical connector from transmitter
R and install protective caps.

R (f) Open and tag circuit breaker OIL QTY (R14).

WARNING: AVOID SKIN CONTACT AND INHALING THE VAPOR WHEN USING DEGREASING FLUID.

R (4) Moisten cloth with degreasing fluid and remove all traces of jointing compound from transmitter and oil tank mounting face (Ref. Fig. 401).

CAUTION: DO NOT ALLOW JOINTING COMPOUND TO ENTER OIL PASSAGES.

R (5) Using stiff-bristle brush, apply thin film of jointing compound to mating faces of oil quantity transmitter and oil tank. Compound must be allowed to air-dry for at least 10 minutes.

R (6) Lubricate new seal ring and O-ring seal(s) (Ref.
R 70-02-01), and install on oil quantity transmitter.

R (7) On engines without RR SB79-4475,
R ensure O-ring seal is in position on support.

R (7) On engines with RR SB79-4475,
R ensure two O-ring seals are in position on support.

CAUTION: TRANSMITTER MUST BE KEPT STRAIGHT DURING INSTALLATION INTO OIL TANK TO ENSURE CORRECT LOCATION IS OBTAINED IN OIL TANK LOWER SUPPORT HOUSING.

THE SUPPORT OF THE OIL QUANTITY TRANSMITTER FITS INTO A LOCATING HOLE INSIDE THE TANK. CARE MUST BE TAKEN TO INSURE THAT THIS SUPPORT DOES NOT MISS THE LOCATING HOLE. THE LAST INCH OF TRAVEL SHOULD BE MADE BY HAND PRESSURE ON THE TRANSMITTER FLANGE. BEFORE INSERTING BOLTS, THE FLANGE SHOULD BE WITHIN ONE-SIXTEENTH INCH AND PARALLEL WITH THE TANK MOUNTING SURFACE.

R R (8) Install oil quantity transmitter with flat side rearwards, into oil tank.

R R (9) Remove protective caps and connect electrical connector to transmitter.

R R (10) Remove tags and close circuit breaker opened in Step 3B(3)(f).

R (11) Close cowl (Ref. 71-11-00 or 71-12-01).

R C (12) Before next flight, verify that oil quantity indicator reads the same quantity as the oil tank.

OIL QUANTITY INDICATOR - REMOVAL AND INSTALLATION

1. Referenced Procedure

   79-37-02 Oil Quantity Indication - Adjustment/Test

2. Removal/Installation

   A. Removal

CR NOTE: Pending modification of the oil system to correct oil
CR migration, the following procedure should be
CR observed: If log remark indicates oil quantity did
CR not drop below 5 quarts and did return to normal in
CR cruise, then no corrective action will be required.
CR Sign off log book referencing this note (by manual
CR chapter/section/subject page number).

   (1) On Flight Engineer/Second Officers aft circuit breaker panel CB3, zone 215, open and tag circuit breaker OIL QTY (R14).

   On Flight Engineer/Second Officers overhead circuit breaker panel CB2, zone 215, open and tag circuit breaker FLIGHT STATION LIGHTS - F/E INSTR (E9).

   (2) Locate applicable oil QUANTITY indicator on ENGINE OIL panel on Flight Engineer/Second Officers lower panel (Ref. Fig. 401).

R (3) Loosen clamp screw next to applicable indicator and
R withdraw indicator from panel to gain access to electrical connector.

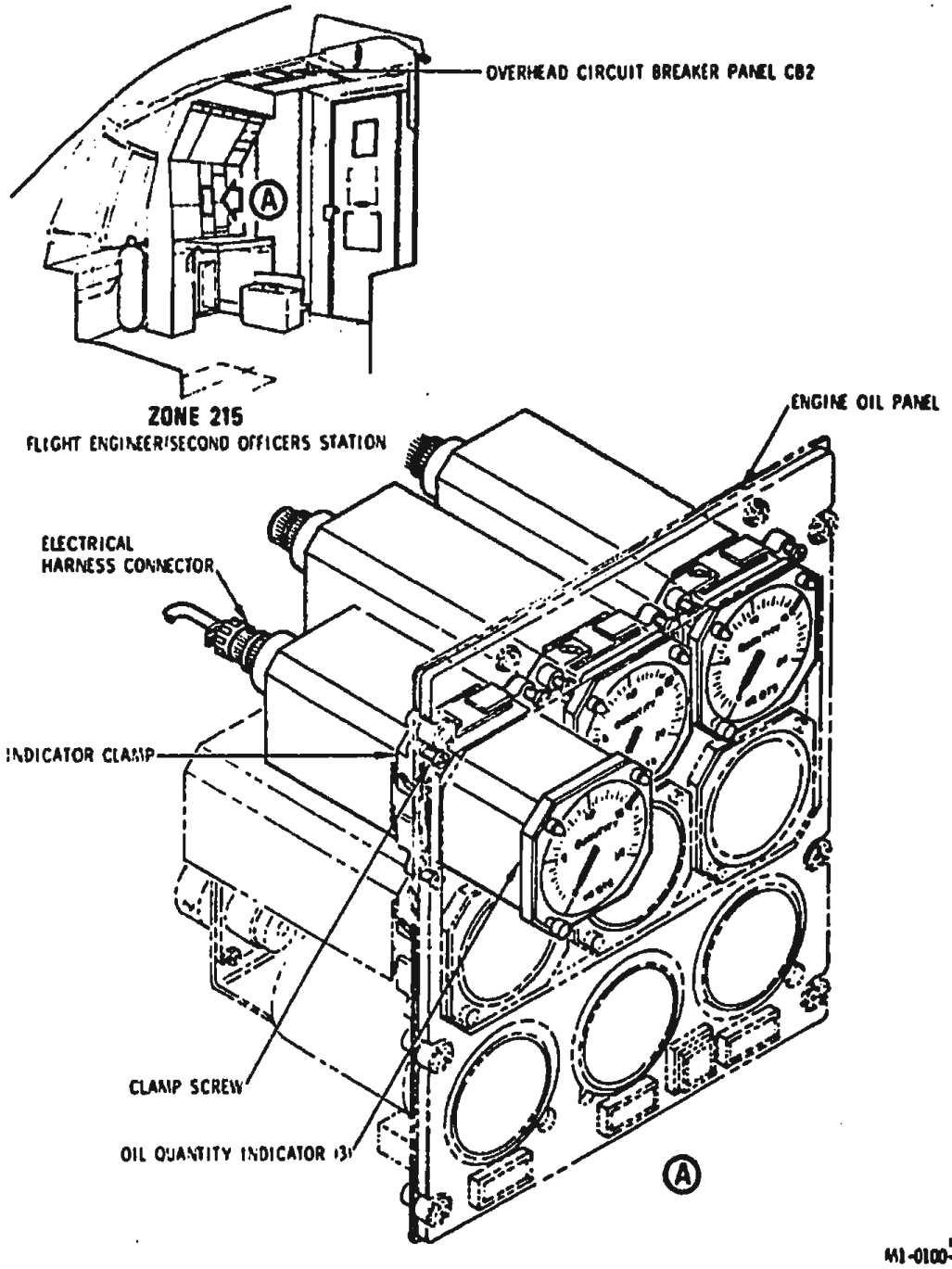
   (4) Disconnect harness connector from indicator receptacle connector. Tape and stow harness connector.

   B. Installation

   (1) Verify that circuit breakers opened in Step A(1) are open and tagged.

   (2) Connect harness connector to indicator receptacle connector.

   (3) Slide indicator into edge-lighted ENGINE OIL panel cutout.



Oil Quantity Indicator - Removal and Installation
Figure 401

R (4) Secure indicator in retaining clamp by tightening clamp screw. Torque clamp screw 5 to 8 lb in.

(5) Remove tags and close circuit breakers opened in Step A(1)

R (6) Perform indicator BITE test (Ref. 79-37-02).

OIL QUANTITY INDICATOR - ADJUSTMENT AND TEST

1. Referenced Procedure

   24-41-00 External Power/Ground Service System - Maintenance Practices

2. Adjustment and Test

   A. BITE Test

      (1) Turn on electrical power (Ref. 24-41-00).

      (2) On Flight Engineer/Second Officers aft circuit breaker panel CB3, verify that circuit breaker OIL QTY (R14) is closed.

      (3) On Flight Engineer/Second Officers lower panel, zone 215, locate applicable oil quantity indicator and the built-in test equipment (BITE) switch in the lower left corner of the indicator.

      (4) Observe quantity of engine oil.

      (5) Depress the indicator bult-in-test-equipment (BITE) actuator and verify that pointer drives to approximately 12 o'clock position on the indicator scale.

      (6) Release the (BITE) actuator and verify that the pointer returns to the original quantity.

      (7) Turn off electrical power (Ref. 24-41-00).